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THE GOOD/LONG/BOYLE TIMBER SALE PROJECT ENVIRONMENTAL ASSESSMENT

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ACRONYMS

A.C.B.	Montana State University Grant
A.C.I.	Montana State University - Morrill Grant
ARM	Administrative Rules of Montana
BF	board feet
BMP	Best Management Practices
BMU	Bear Management Unit
C.S.	Common School Grant
dbh	Diameter at breast height
D.D.& A.	Deaf Blind School Grant
DEQ	Department of Environmental Quality
DF	Douglas-fir
DFWP	Montana Department of Fish, Wildlife and Parks
DNRC	Department of Natural Resources and Conservation
EA	Environmental Assessment
ECA	equivalent clearcut acres
EIS	Environmental Impact Statement
ES	Engelmann spruce
FEIS	Final Environmental Impact Statement
FI	forest improvement
FNF	Flathead National Forest
HB	House Bill
ID Team	Interdisciplinary Team
KNF	Kootenai National Forest
LP	lodgepole pine
Land Board	Montana State Land Board
MBF	thousand board feet
MC	mixed conifer
MCA	Montana Codes Annotated
MEPA	Montana Environmental Protection Act
MMBF	million board feet
NCDE	Northern Continental Divide Ecosystem
NWLO	Northwestern Land Office
OSHA	Occupational Safety and Health Administraton
P.B.	Public Buildings Grant
POR	percent of open roads
PP	ponderosa pine
PTR	percent of total roads
RV	residual value
SAF	subalpine fir
SFLMP	State Forest Land Management Plan
SLI	stand-level inventory
S.M.	School of Mines Grant
SMZ	streamside management zone
S.N.S.	State Normal School
SSFI	sale-specific forest improvement
TMDL	total maximum daily load
TPA	trees per acre
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USFS	United States Forest Service
WL	western larch
WWP	western white pine
WYI	water yield increase

124 Permit	Stream Preservation Act Permit
3A Authorization	A Short-term Exemption from Montana's Surface Water Quality Standards

DEPARTMENT OF NATURAL RESOURCES
AND CONSERVATION
2705 Spurgin Road, Missoula, MT 59804-3199
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MARC RACICOT
GOVERNOR

STATE OF MONTANA

DIRECTOR'S OFFICE (406) 444-2074
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August 28, 2000

GOOD/LONG/BOYLE TIMBER SALE PROJECT
ENVIRONMENTAL ASSESSMENT

Enclosed is a copy of the Environmental Assessment for the Good/Long/Boyle Timber Sale Project. This sale is located in Sections 17, 19, 27, 28, 29, 30, 31, 32 and 33, Township 32 North, Range 23 West, and Section 1, Township 31 North, Range 24 West, in the Stillwater State Forest. It is located immediately south of Olney, Montana in Flathead County. The selected alternative will harvest approximately 5 million board feet (MMBF) from 1,207 acres; replace 2 old bridges; and improve sites along existing roads to enhance road drainage.

DNRC will accept comments on this proposed action until September 29, 2000. Along with your comments, please be sure to include your name, address, telephone number and the title of the document for which you are providing comments. Address your comments to:

Thomas M. Schultz, Jr., Chief
Forest Management Bureau
DNRC Trust Land Management Division
2705 Spurgin Road
Missoula, MT 59804

Thank you for your interest in the management of state-owned forest lands.

Sincerely,

Thomas M Schultz

THOMAS M. SCHULTZ, JR., Chief
Forest Management Bureau
Trust Land Management Division

TS:kmk

Enclosure

C 17 2002

PROPOSED GOOD/LONG/BOYLE TIMBER SALE PROJECT FINDING

An interdisciplinary team (ID Team) has completed the Environmental Analysis (EA) for the proposed Department of Natural Resources and Conservation (DNRC) Good/Long/Boyle Timber Sale Project. After a thorough review of the EA; project file; public correspondence; Department policies, standards and guidelines; and the State Forest Land Management Plan (SFLMP), I have made the following 3 decisions:

ALTERNATIVE SELECTED

Presented and fully analyzed in the EA were 2 alternatives:

- *Action Alternative B* - proposes harvesting approximately 5 million board feet (MMBF) of timber from 1,207 acres; replacing 2 old bridges; and improving sites along existing roads to enhance road drainage (*EA, page I-1*).

- *No-Action Alternative A* - includes existing activities, but does not include a timber sale (*EA, page II-2*).

I have selected Action Alternative B without additional modifications For the following reasons:

- Action Alternative B meets the purpose of action and the specific project objectives (EA, pages I-1 and I-2.

- The analysis of identified issues did not reveal information compelling the Department not to implement the timber sale project.

- Action Alternative B includes activities to address the environmental concerns expressed by the public. For example, it includes:
  - site improvements along roads to improve water quality (*EA, page II-2*);
  - funds for control of noxious weeds and forest improvement (FI) work, such as tree planting, precommercial thinning, and road maintenance (*EA, page II-3*);
  - dust abatement application to reduce road dust if needed; and
  - retention of snags and large seral trees in the proposed harvest units to provide habitat for wildlife (EA Appendix A).

SIGNIFICANCE OF IMPACTS

For the following reasons, I find that Action Alternative B will not have significant impacts on the human environment:

- Water Quality

  The annual water-yield increases of the watersheds within the project area will remain well below the threshold for concern set for each watershed; in-stream erosion rates are not likely to increase (EA IV-25). Proposed road-drainage improvements will provide additional protection from sediment entering stream channels (EA IV-25). Stipulations to mitigate water-quality impacts and requirements in permits administered by other agencies would be implemented by DNRC for relevant project activities (*EA, page IV-25, and Appendix A*).

- Fisheries

  Harvest units will be located well away from fish-bearing streams (*EA, page IV-26*). No harvesting in SMZs on fish-bearing streams is proposed. The water quality or channel characteristics are unlikely to be negatively affected; therefore, fish habitat would not be adversely affected. The bridge replacement on the West Fork of Swift Creek would be done in compliance with all required permits and would not inhibit fish passage or migration.

- Soils

  Action Alternative B would include mitigation to reduce the amount of area on which equipment would operate, limit equipment operations to periods where soils are dry enough to reduce impacts to soil productivity; in some cases, equipment operation will be limited to periods when winter conditions protect soils (EA, page IV-27, and Appendix A).

- Big Game Habitat

  Action Alternative B would retain vegetation along open roads and meadows to provide security for big game (EA, page IV-37). Harvest units would be irregular in shape and provide good edge habitat for deer. A deer migration corridor in the project area would retain its connectivity and no long-term changes in road density would occur. Segments of 2 loop roads will be closed, which will improve wildlife security. Many existing harvest units in the area are beginning to provide hiding cover or will in the near future.

- Grizzly Bears

  Approximately 12,796 acres of hiding cover will remain in the Lazy Creek Grizzly Bear subunit following the proposed action (EA, page II-15). At the end of the proposed activity, the percent of open road density will be reduced by one percent; it will return to the original levels following the closure. Mitigation would be applied that would require:

  - harvesting in spring bear habitat to occur after the spring season (EA, page IV-31);
  - Contractors working on this project will be required to store garbage that might attract bears in a safe place; and
  - activities that cause an imminent confrontation or conflict between grizzly bears and humans will be suspended when needed.

- Bald Eagle

  No changes are proposed in the nest area. Harvesting activities will be seasonally timed to provide additional security during the nesting period (EA, page IV-29). The proposed road closures will increase security near the eagle nest and a buffer along Lower Stillwater Lake and a portion of Stillwater River will be maintained to protect perching habitat (EA, page IV-30).

- Old-Growth-Associated Species

  Habitat components, such as large live trees, snags, and coarse woody material, will be retained in areas where harvesting is proposed (EA, page IV-29). Timber stands that are adjacent to perennial streams and lakes in the project area and have the highest attribute levels will not be entered with harvesting activities with this proposed action.

- Noxious Weeds

  Equipment would be cleaned prior to entering the project area. Disturbed areas would be grass seeded. The current monitoring and control program is a cooperative effort between DNRC and Flathead County and will continue. Funds would be collected for future monitoring and weed control. These actions would prevent extensive or severe noxious-weed infestation or spread. Use of herbicides is not extensive, nor is it being applied to sensitive areas. Herbicide use is strictly controlled through Environmental Protection Agency (EPA) requirements.

- Old Growth

  Timber stands classified as a western larch/Douglas-fir cover type that met DNRC's current minimum old-growth working definition were not proposed for harvesting at this time. Timber stands with the highest attribute levels and are adjacent to perennial streams and lakes in the project area are not being entered with harvesting activities in this proposed action. Timber stands that meet DNRC's old-growth definition and would be entered with this proposal have been previously entered with harvesting, which have reduced the in-stand old-growth attributes. Because of the stand condition and location on the landscape, the stands that were proposed for harvesting in this action have not been identified in previous planning work as high-priority stands to maintain and manage as part of DNRC's old-growth commitment for Stillwater Unit. After these proposed harvesting activities and reductions from other projects, Stillwater Unit would have approximately 37,388 acres that meet DNRC's working old-growth definition (EA, pages III-11 and IV-10). To meet SFLMP commitments on the Stillwater Unit, the minimum old-growth retention is approximately 16,106 acres.

- Economics

  The number of people expected to recreate on State land in and adjacent to the proposed project area is expected to expand in the future due to increases in population (EA, page II-12) regardless of the implementation of the proposed actions. The total value to State Lands from stumpage, FI funds collected, and development (improvements to the transportation infrastructure) would be approximately $1,434,360. The harvesting of 5 MMBF of timber could positively affect the local economy by providing approximately 10.58 jobs per MMBF harvested (EA, page IV-21).

- Cultural Resources

  The project area has been inventoried for cultural resources 3 times in the past; no cultural resources were identified (project file 605).

- Air Quality

  Burning operations will be done in compliance with the Montana Airshed Group regulations or restrictions for Airshed 2. Burning will be done during acceptable ventilation and dispersion conditions. Dust abatement may be applied to some segments of Martin Camp, Lupfer, and USFS 60E roads, if needed for log-hauling operations (EA, Appendix A).

Precedent Setting and Cumulative Impacts

The project area is located on State-owned lands that are "principally valuable for the timber that is on them or for growing timber or for watershed protection" *(Montana Codes Annotated [MCA] 77-1-402)*. The proposed timber sale is similar to past projects that have occurred in the area. Since the EA does not identify future actions that are new or unusual, the proposed timber sale is not setting precedence for a future action with significant impacts.

Taken individually and cumulatively, the identified impacts of the proposed timber sale are within threshold limits. Proposed timber sale activities are common practices; none of the project activities are being conducted on important fragile or unique sites.

The proposed timber sale conforms to the management philosophy adopted by DNRC in the SFLMP and is in compliance with existing laws, policies, guidelines, and standards applicable to this type of proposed action.

SHOULD DNRC PREPARE AN ENVIRONMENTAL IMPACT STATEMENT (EIS)?

Based on the following, I find that an EIS does not need to be prepared:

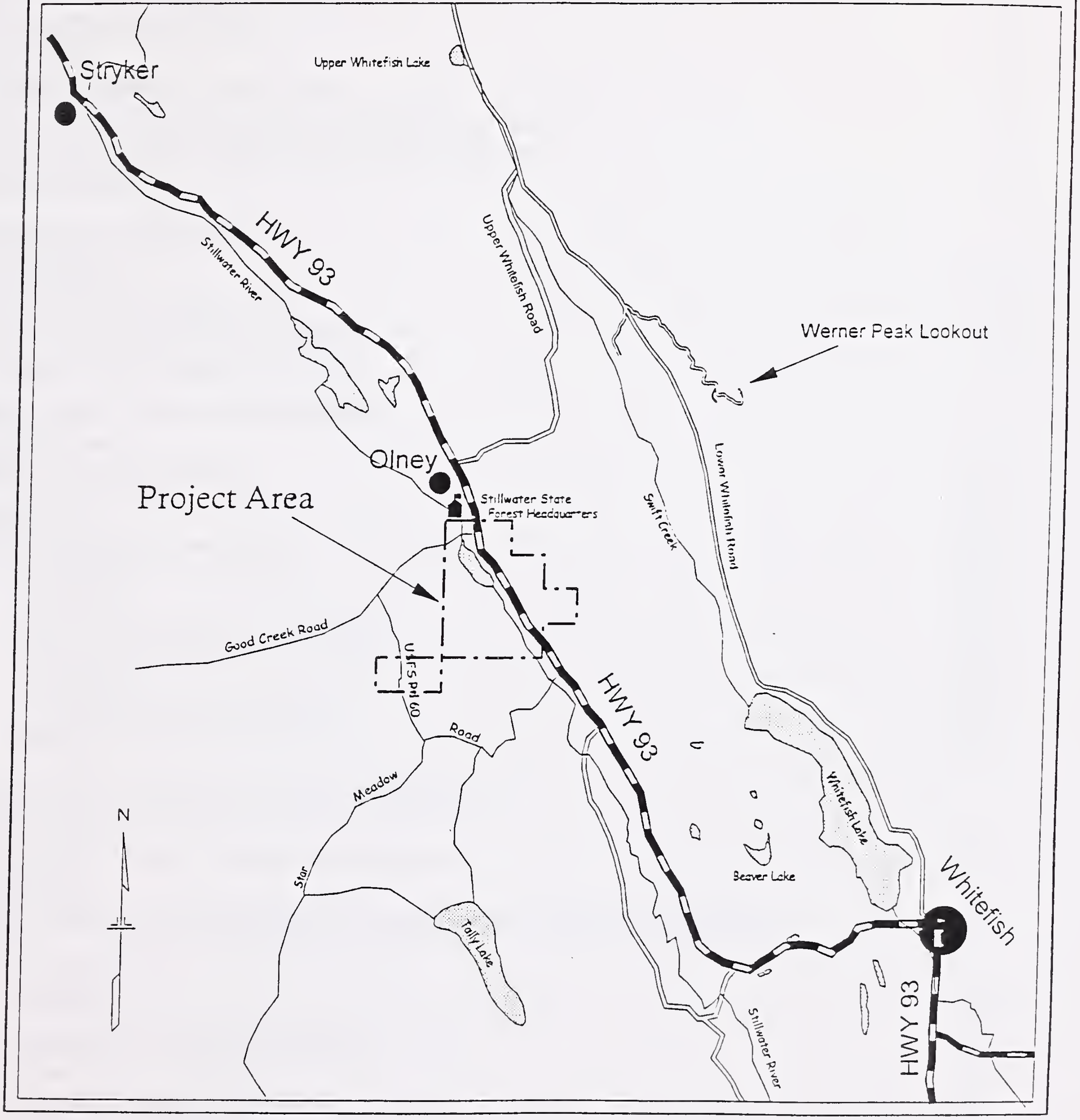
- The EA adequately addressed the issues identified during project development and displayed the information needed to make the decisions.
- Evaluation of the potential impacts of the proposed timber sale indicates that no significant impacts would occur.
- The ID Team provided sufficient opportunities for public review and comment during the development and analysis of the project. Public concerns were incorporated into the project design and analysis of impacts.

Brian Manning

Brian Manning

Forest Management Specialist
Stillwater State Forest
July 26, 2000

Good/Long/Boyle Project Vicinity



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GOOD/LONG/BOYLE TIMBER SALE PROJECT

CHAPTER I

PURPOSE AND NEEDS

INTRODUCTION AND DESCRIPTION OF THE PROPOSED ACTION

Stillwater State Forest, Montana Department of Natural Resources and Conservation (DNRC), proposes the Good/Long/Boyle Timber Sale Project. Timber harvesting, bridge replacements, and road-drainage improvements on existing roads are the primary activities associated with this project.

If the harvest alternative were selected, approximately 5 million board feet (MMBF) of timber would be harvested from 1,207 acres. The total project area is 6,640 acres in size and encompasses all or portions of Sections 17, 19, 27, 28, 29, 30, 31, 32, and 33, Township 32 north, Range 23 west, and Section 1, Township 31 north, Range 24 west. The area is located immediately south of the town of Olney, Montana on both sides of Stillwater River and U.S. Highway 93.

PURPOSE

The lands involved in the proposed project are held by the State of Montana in trust for the support of specific beneficiary institutions, such as public schools, State colleges and universities, and other specific State institutions, such as the school for the deaf and blind (*Enabling Act of February 22, 1889; 1972 Montana Constitution, Article X, Section 11*). The Board of Land Commissioners and DNRC are required by law to administer these trust lands to produce the largest measure of reasonable and legitimate return over the long run for these beneficiary institutions, *Section 77-1-202, Montana Codes Annotated (MCA)*. On May 30, 1996, DNRC released the Record of Decision on the State Forest Land Management Plan (SFLMP). The Land Board approved the SFLMP's implementation on June 17, 1996. The SFLMP outlines the management philosophy of DNRC in the management of State forested trust lands and sets out specific Resource Management Standards for 10 resource categories.

The Department will manage the lands involved according to the philosophy and standards in the SFLMP, which states:

> ***"Our premise is that the best way to produce long-term income for the trust is to manage intensively for healthy and biologically diverse forests. Our understanding is that a diverse forest is a stable forest that will produce the most reliable and highest long-term revenue stream...In the foreseeable future, timber management will continue to be our primary source of revenue and our primary tool for achieving biodiversity objectives."***

PROPOSED OBJECTIVES

In order to meet the goals of the management philosophy adopted through a programmatic review of the SFLMP, DNRC has set the following specific project objectives:

- Harvest 3 to 5 MMBF of sawtimber and small roundwood to generate revenue for the appropriate school trusts.
- Replace a temporary bridge on the West Fork of Swift Creek with a permanent bridge.
- Move the forest toward appropriate or desired future conditions characterized by the proportion and distribution of forest types and structure historically present on the landscape.
- Improve the long-term productivity of the timber stands by increasing vigor, reducing incidence of insect and disease infestations, and regenerating portions of the stands where timber-stand growth is decreasing. Actions would be done in a manner that maintains site productivity and favors the retention and regeneration of appropriate species mixes. Harvesting would be done to reduce the hazard of heavy fuel loading and risk of large wildfires that would be difficult to control.
- Provide for additional benefits and maintain options for sustained revenue to the school trusts by:
    - completing site improvements on existing roads to improve drainage, water quality, and safety to meet current Best Management Practice Standards (BMPs);
    - improving the effectiveness of existing road closures to provide wildlife security and allow better control of unseasonable use of roads, thereby protecting water quality and the State's investment in the roads;
    - reducing the spread of noxious weeds with a monitoring and treatment program; and
    - replacing bridges that no longer meet safety standards.

RELATIONSHIP TO THE SFLMP

The SFLMP is a programmatic plan that provides field personnel with consistent policy, direction, and guidance for the management of State forested lands. It contains the general philosophies and management standards that will provide the framework for project-level decisions.

The planning of the proposed Good/ Long/Boyle Timber Sale Project was guided by the SFLMP. The SFLMP philosophy and appropriate resource-management standards have been incorporated into the design of the proposed actions. The Good/Long/ Boyle Timber Sale Project Environmental Assessment (EA) is not intended as a programmatic or area plan and is limited to addressing specific proposed actions in reference to issues that were identified through public and Interdisciplinary Team (ID Team) input.

EA PROCESS

EA DEVELOPMENT

The EA was prepared in compliance with the Montana Environmental Policy Act (MEPA). MEPA requires State government to include consideration of environmental impacts into its decision-making process and to inform the public and other interested parties of proposed projects, environmental impacts that may result, and alternative actions that could achieve the project's objectives.

PUBLIC SCOPING

The initial stage of an EA is the public scoping process, which is used to inform the public that a State agency is proposing an action and gather comments or concerns about the possible impacts of the project.

One period of public comment has taken place:

- DNRC solicited public participation in the Good/Long/ Boyle Timber Sale Project on November 25, 1999 by advertising the proposed action in the Whitefish Pilot Newspaper.
- A letter describing the proposed project was sent by mail to individuals, agencies, industry representatives, and other organizations that had expressed interest in Stillwater State Forest's management activities and are included on the mailing list. The mailing list is located in the project file.
- Concerns and comments on DNRC's initial proposal were requested; individuals and organizations were allowed 30 days to respond.
- The issues and concerns identified from public scoping are summarized in this chapter; the original comments are located in the project file at the Stillwater Unit office in Olney, Montana.

EA DEVELOPMENT AND DECISION PROCESS

Preparation of this EA was DNRC's next step. Public comments related to issues that could affect the project were incorporated into the document. Upon completion of the analysis, the EA and Finding will be circulated to parties who, through a Request for Information, asked for a copy. DNRC allows for a 30-day comment period to consider public and internal input to ensure adequate analyses has been done.

The decisions presented with the published document will become recommendations by DNRC to the State Land Board (Land Board). Ultimately, the Land Board will make the final decisions regarding which action to implement.

PROPOSED SCHEDULE OF ACTIVITIES

If the timber-harvesting alternative is selected, a Timber Sale Contract package for the timber sale and proposed road improvement would be prepared during the winter of 2001.

This package is tentatively scheduled for presentation to the State Land Board in April, 2001. If the timber sale is approved by the Land Board, the sale would be advertised in the summer of 2001. Harvesting and road-construction activities would occur over a 3-year period, approximately. Postharvest activities, such as site preparation, planting, and hazard reduction, would follow harvesting activities.

OTHER ENVIRONMENTAL REVIEWS RELATED TO THE PROJECT

In order to address indirect, direct, and cumulative effects on a landscape level, the analysis must incorporate past, present, and future timber sales within the analysis area. The analysis area used for the vegetation portion of this document includes Stillwater State Forest and scattered sections to the north. The environmental analysis area for watersheds, wildlife, soils, fisheries, and economics is somewhat smaller in size and encompasses an area specific to those disciplines. *(Refer to Chapter IV and Appendix D for related activities on State and adjacent ownership.)*

The United States Forest Service (USFS), Tally Lake Ranger District, has completed the Good Creek

Resource Management Project Final Environmental Impact Statement (FEIS); the project is located adjacent to the Good/Long/Boyle Timber Sale Project area to the west. Although this is not a part of the analysis area, that FEIS was utilized to analyze effects to resources on this project. Depending upon which resource is being considered by DNRC, some impacts are expected to occur as a result of implementation of the USFS project. These effects are analyzed in Chapter IV.

OTHER AGENCIES WITH JURISDICTION/PERMITS REQUIRED

The Montana Department of Fish, Wildlife and Parks (DFWP) has jurisdiction over the management of all fisheries and wildlife in the project area. DFWP is on the mailing list and has received the initial proposal and newsletter.

DNRC has had an ongoing contract with DFWP to collect data and monitor streams in Stillwater State Forest for existing fisheries habitat and the presence/absence of bull trout and westslope cutthroat trout.

PERMITS THAT MAY BE REQUIRED TO IMPLEMENT THE PROPOSED ACTIONS

- A Stream Preservation Act Permit (124 Permit) is required from DFWP for activities that influence any fisheries stream.
- A Short-term Exemption from Montana's Surface Water Quality Standards (3A Authorization), issued by the Montana Department of Environmental Quality (DEQ), may be required if:
  - temporary activities will introduce sediment above natural levels into streams and
  - DFWP feels the permit is necessary after reviewing the mitigation in the 124 Permit.
- DNRC is a member of the Montana Airshed Group, which regulates DNRC slash burning. DNRC receives an air-quality permit through participation in the Montana Airshed Group.

PUBLIC CONCERNS

Through the scoping process, concerns were raised by the public and specialists of DNRC and other agencies about the project's potential impacts on the environment. These concerns were considered by DNRC in the development of project alternatives *(Chapter II)*. A summary of the comments that were incorporated into the alternatives is presented below.

FISHERIES:

Concern was expressed that fish habitat may be reduced in quality due to sediment from ground-disturbing activities and water-yield increases.

HYDROLOGY/WATER QUALITY:

- Concern was expressed that effects of past and proposed ground- disturbing activities, including timber harvesting and road-management activities may increase sediment that could, potentially, be routed to streams.
- A concern was expressed that water-yield increases, due to timber harvesting and associated ground-disturbing activities, may result in channel degradation and in-stream erosion.

SOILS:

A concern was expressed that cumulative soil impacts may reduce site productivity and regeneration success.

***WILDLIFE*:**

- Timber harvesting may affect wildlife habitat quality and/or quantity.
- Timber harvesting may reduce hiding and thermal cover for big game.
- Road management may affect wildlife security.
- Road management may affect hunter opportunities.

***THREATENED, ENDANGERED AND SENSITIVE SPECIES*:**

- Timber harvesting and road management may affect grizzly bear habitat and cause disturbance, potentially resulting in altered use patterns and/or increased mortality.
- Timber-harvesting activities may cause disturbance to nesting bald eagles and affect their habitat.
- Timber harvesting in old growth may affect habitat quality and/or quantity with respect to old-growth-associated species.

VEGETATION:

- Concern has been expressed that the introduction and spread of noxious weeds may result from ground-disturbing activities such as timber harvesting and road management.
- A concern was raised that the introduction and spread of noxious weeds may affect sensitive plants, native plant communities and, subsequently, wildlife.
- Concerns were expressed that timber harvesting may increase the potential for blowdown in leave trees and trees adjacent to harvested areas.

OLD GROWTH:

Concerns were raised that timber harvesting may affect the amount and distribution of old-growth and recruitment old-growth forest stands.

***ECONOMICS*:**

Concerns were expressed that timber harvesting and road management may affect hunting and recreational opportunities, therefore changing potential sources of revenue.

***CULTURAL RESOURCES*:**

A concern was raised that timber harvesting and ground-disturbing activities may alter or destroy cultural resources.

AIR QUALITY:

A concern was expressed that log hauling would increase dust and reduce air quality near residences.

GOOD/LONG/BOYLE TIMBER SALE PROJECT

CHAPTER II

ALTERNATIVES

INTRODUCTION

Chapter II introduces the proposed Good/Long/Boyle Timber Sale Project action alternative and summarizes the effects of implementing this alternative. The first part of this chapter focuses on the development of alternatives. The latter part of Chapter II *(Table II-2)* briefly outlines the probable environmental consequences associated with each alternative and summarizes effects of the detailed environmental analysis in Chapter IV.

DEVELOPMENT OF ALTERNATIVES

An ID Team was formed in April, 1999, to work on the Good/Long/Boyle Timber Sale Project. The role of an ID Team is to develop management options within a project area and analyze potential impacts on the human and natural environment. Alternative development for the Good/Long/Boyle Timber Sale Project began when DNRC initiated a proposed action and project time line.

After a field review of the project area, a public scoping notice was sent out in September, 1999; a 30-day comment period followed. A set of project issues were developed from the public comments that were received *(Chapter I, Public Scoping)*.

ID Team members and other DNRC personnel were involved in a thorough field reconnaissance of the Good/Long/Boyle Timber Sale Project area between April and December of 1999. Data was collected for the project area resources and transportation systems to aid in the analyses of wildlife habitat, hydrology, timber harvesting, road standards, economics, and the development of mitigation. Additional information about the affected environment was collected to assist in designing mitigation and completing analysis work.

The ID Team discussed ideas on how to address issues, generate additional revenue for the school trust, and meet DNRC's biodiversity guidance. DNRC's SFLMP contains a set of Resource Management Standards that played an important role in the types of mitigation measures and management options developed during this phase of the project. These ideas were incorporated into a management proposal.

ALTERNATIVES CONSIDERED, BUT NOT GIVEN DETAILED STUDY

DNRC was unable to implement several other proposed alternatives (post and pole market exploration, recreational possibilities) due to constraints found in the SFLMP or the inability to adequately mitigate for environmental consequences. The ID Team felt that the issues directly related to proposed activities with Action Alternative B could be adequately addressed through design and mitigation; therefore, those concerns did not drive further alternative development.

NO-ACTION ALTERNATIVE A

The No-Action Alternative would not have proposed timber harvesting, bridge replacement, or road reconstruction occur in the Good/Long/Boyle Timber Sale Project area at this time. Recreational use, firewood cutting, road maintenance, fire suppression, additional requests for permits and easements, and other ongoing management activities may occur. Natural events, such as plant succession, windthrow, and wildfires, would continue to occur. Future actions, including timber harvesting, would be proposed and go through the appropriate environmental analysis before implementation. More effective permanent road closures will be installed to protect water quality, wildlife security, and investments in road maintenance.

No-Action Alternative A, which can be used as a baseline for comparing the environmental consequences of the Action Alternative B, is considered a viable alternative for selection.

ACTION ALTERNATIVE B **(The decisionmaker may select a modification or combination of alternatives)**

The ID Team developed the timber-harvesting alternative based on an analysis of current and appropriate timber-stand conditions. Proposed treatments would move the timber-stand conditions toward appropriate age-class and cover-type conditions historically present upon the landscape. Details on appropriate conditions are described in the DNRC Biodiversity Guidance.

Existing open and closed roads would be used to access harvest units. Several short temporary spur roads are proposed for improved yarding access and would be reclaimed after harvesting activities are completed to prevent motorized use. Surveys of the existing roads have been conducted in the gross sale area to identify erosion and surface-drainage problems that could be improved to prevent sediment delivery to streams. In a road-development proposal, under the Action Alternative, sediment-delivery reduction and the implementation of BMPs would be accomplished through a road-improvement package that meets the following objectives:

- Continues to accommodate a moderate level of dispersed recreation on open roads.
- Improves the effectiveness of road closures to mitigate for wildlife and water quality and protect investments in road maintenance.
- Improves ditch relief, surface drainage, and safety of Martin Camp Road and its associated spurs within the Martin Camp/ Lupfer transportation systems. These improvements include the replacement and installation of culverts, drive-through drain dips, and safety turnouts, and the removal of "right-of-way" trees to improve visibility. The main Lupfer Road was improved extensively in recent years and would require only minor ditch-maintenance work and grading.
- Ensures long-term safety through the replacement of an older log-stringer bridge in Section 31, T32N, R23W (Good/Long/Boyle Timber Sale Project area) and the temporary bridge that spans the West Fork of Swift Creek on the Antice road system in the SW1/4, Section 34, T34N, R22W *(see Stillwater State Forest Map, Appendix B)*. The current bridge will continue to provide short-term access in each of these locations, but, eventually, must be replaced in order to meet BMPs and safety standards. DNRC has a road-maintenance budget, but most improvements to State forest transportation systems are funded through timber harvesting.

The following concepts were used to determine which stands would be prioritized for treatment under the Action Alternative:

- The health and vigor of forest stands would be improved by reducing the stand density, salvaging trees attacked by insects and diseases, and establishing vigorous regeneration with a species mix that includes western larch, Douglas-fir, lodgepole pine, ponderosa pine, and rust-resistant western white pine in the openings created through timber harvesting.

- The western larch and Douglas-fir cover types were determined to be the most underrepresented cover type on Stillwater State Forest. Western white pine has been greatly reduced due to natural and introduced forest pests. Alternative B would help promote the regeneration of western larch, rust-resistant western white pine, ponderosa pine, and Douglas-fir.

- The natural role of wildfire in this area would be reflected by manipulating the stand structure and species composition and varying the silvicultural prescriptions. Thus, the potential risks of uncontrollable fire hazards would be minimized and opportunities would be provided for site preparation using prescribed burns.

- Elements used to determine the relative value of old-growth stands on Stillwater State Forest were:

  - patch size
  - connectivity
  - old-growth attribute levels
  - assigned cover type
  - their location on the landscape

  This criteria, along with input from the Northwestern Land Office (NWLO) wildlife biologist was used to determine the value of functionally important old-growth stands in the project area. Through this analysis process, all Douglas-fir/western larch old-growth stands were deferred for future management opportunities.

- Fire and management activities from early in the last century have contributed to a high proportion of crowded and suppressed forest stands throughout the project area. Where economically viable, these stands were targeted for a commercial thinning or conversion-type harvest.

An estimated 1,207 acres are proposed for harvesting under Alternative B and approximately 5,097 MBF in sawlog and studlog material would be removed *(refer to Table II-1)*. These acre and volume estimates are likely to vary as streamside management zones (SMZ), fisher buffers, ponds, and other adjustments are taken into consideration.

TABLE II-1 PROPOSED SILVICULTURAL TREATMENTS FOR ALTERNATIVE B

UNIT #	ACRES	TREATMENT	YARDING METHOD	HARVEST VOLUME (MBF)	SITE PREPARATION	HAZARD REDUCTION	METHOD OF REGENERATION IN PORTIONS OF UNIT BEING REGENERATED
1	41	Commercial thin	Tractor	120	N/A	Jackpot burn	Fully stocked.
2	10	Clearcut w/reserves	Tractor	32	Machine scarify	Broadcast/ jackpot burn	Fully plant with larch, ponderosa pine, western white pine, and Douglas-fir.
3	15	Clearcut w/reserves	Tractor	59	Machine scarify	Broadcast/ jackpot burn	Fully plant with larch, ponderosa pine, western white pine, and Douglas-fir.
4	15	Modified seedtree/ shelterwood w/reserves	Tractor	72	Machine scarify	Jackpot burn	Interplant with western larch and western white pine.
5	139	Modified seedtree/ shelterwood w/reserves	Tractor	490	Machine scarify	Broadcast/ jackpot burn	Interplant with western larch, western white pine, and ponderosa pine.
6	118	Modified seedtree/ shelterwood w/reserves	Tractor	815	Machine scarify	Broadcast/ jackpot burn	Interplant with western larch, western white pine, and ponderosa pine
7	236	Commercial thin	Tractor	1,080	N/A	Jackpot burn	Fully stocked
8	104	Modified seedtree/ shelterwood w/reserves	Tractor	530	Machine scarify	Jackpot burn	Interplant with western larch, western white pine, and ponderosa pine
9	53	Modified seedtree/ Shelterwood w/reserves	Tractor	240	Machine scarify	Jackpot burn	Interplant with ponderosa pine, western larch, and western white pine. Rely on natural regeneration of lodgepole pine and Douglas-fir.
10	59	Seedtree and clearcut w/reserves	Tractor	162	Machine scarify	Broadcast/ jackpot burn	Plant ponderosa pine, western larch, and western white pine. Rely on natural regeneration of lodgepole pine and Douglas-fir.
11	107	Commercial thin and shelterwood w/reserves.	Tractor	325	Machine scarify	Jackpot burn	Interplant western larch, ponderosa pine, and western white pine.

UNIT #	ACRES	TREATMENT	YARDING METHOD	HARVEST VOLUME (MBF)	SITE PREPARATION	HAZARD REDUCTION	METHOD OF REGENERATION IN PORTIONS OF UNIT BEING REGENERATED
12	16	Modified seedtree/ shelterwood w/group selection	Tractor	120	Machine scarify	Jackpot burn	Natural regeneration of Douglas-fir, lodgepole pine, western larch, and spruce if scarified. Interplant ponderosa pine, western larch, and western white pine.
13	123	Improvement cut/ seedtree with reserves	Tractor	424	Machine scarify	Broadcast/ jackpot burn	Natural regeneration of lodgepole pine, Douglas-fir, and western larch. Interplant western larch, western white pine, and ponderosa pine.
14	106	Commercial thin/ improvement cut/ seedtree w/reserves	Tractor	376	Machine scarify	Jackpot burn	Natural regeneration of lodgepole pine, Engelmann spruce, Douglas-fir, and western larch. Interplant western larch, western white pine, and ponderosa pine.
15	41	Modified seedtree w/ reserves and group-select openings	Tractor	158	Machine scarify	Broadcast/ jackpot burn	Natural regeneration of lodgepole pine, Douglas-fir, and western larch. Interplant western larch, western white pine, and ponderosa pine.
16	24	Modified seedtree w/ reserves and group-select openings	Tractor	94	Machine scarify	Jackpot burn	Natural regeneration of lodgepole pine, Douglas-fir, and western larch. Interplant western larch, western white pine, and ponderosa pine.
Total estimated harvest acres: 1,207 Total estimated harvest volume: 5,097 MBF							

PROPOSED SILVICULTURAL TREATMENTS

If Alternative B were chosen, a combination of 5 different harvest treatments (silvicultural prescriptions) would be required to meet the described management objectives.

These silvicultural treatments are designed to reflect the historical effects of natural mixed-severity fires. Where the existing stand would allow, natural levels of the multistoried forest structure would be retained to perpetuate species diversity. The *Graphical Reproduction of Silvicultural Treatments* provides a visual representation of how these treated areas may appear following harvesting. The visualizations are only a qualitative approximation of what would be expected to occur on the ground due to the variations in stand age, species components, and natural openings.

- ***MODIFIED SEEDTREE WITH RESERVES*** - Five to eight trees per acre of large western larch, Douglas-fir, and western white pine would, individually and in clumps, provide a seed source, future snags, and cavity-nesting sites. Existing snags and small clumps of younger trees would also be retained to provide for both structural and species diversity.

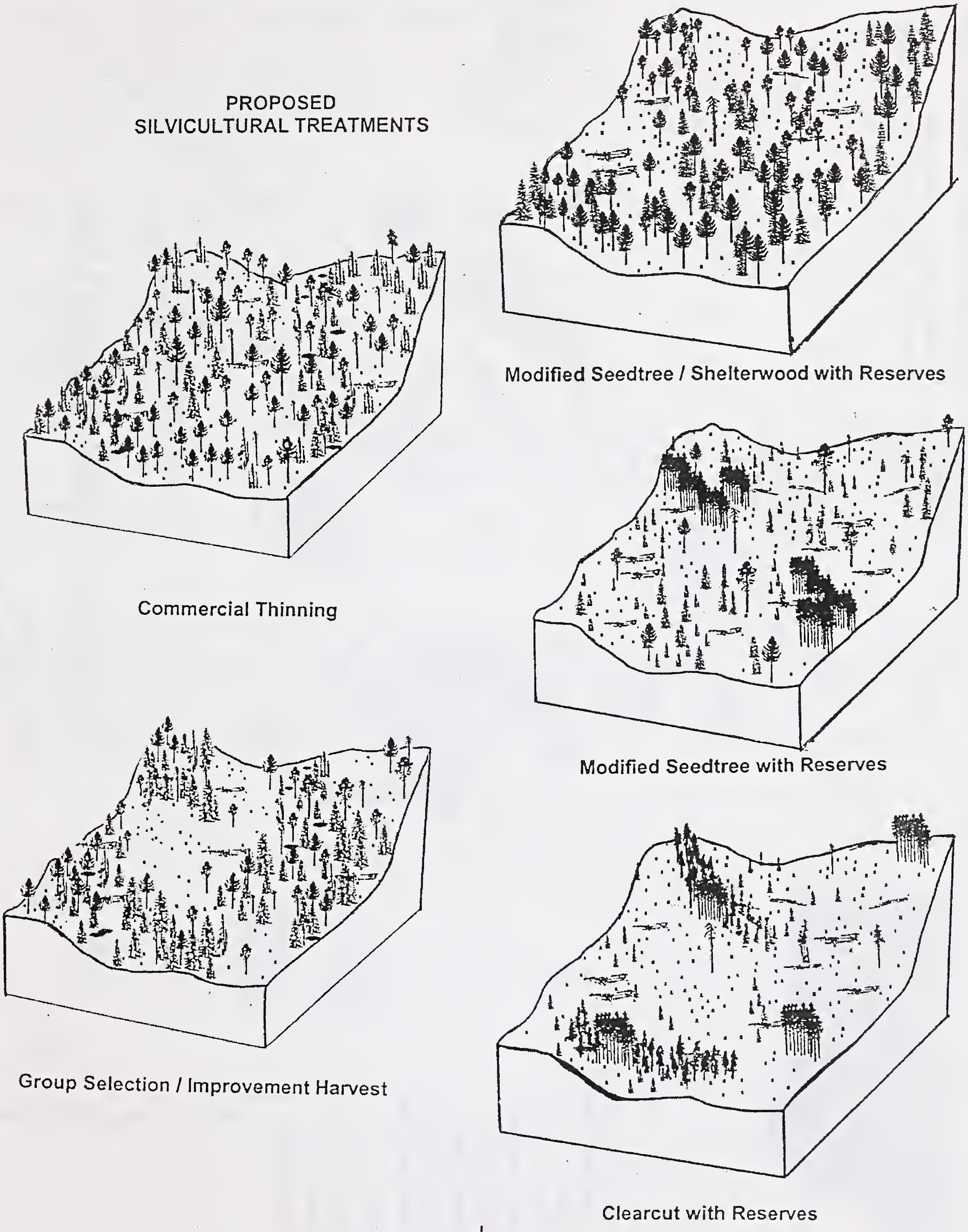
- ***MODIFIED SEEDTREE/SHELTERWOOD WITH RESERVES*** - Five to eight large western larch, Douglas-fir, and western white pine seedtrees per acre would, individually and in clumps, provide a seed source, future snags, and cavity-nesting sites; approximately 40 trees per acre would be retained in shelterwood areas. Existing snags and small clumps of younger trees would also be retained to provide for structural and species diversity.

- ***COMMERCIAL THIN*** - Forty to sixty percent of the existing overstory would be harvested to reduce the stocking density, improve growth rates and vigor, and increase the seral composition in the stand. The residual stand would be comprised of the most vigorous, largest diameter trees currently on site.

- ***GROUP SELECTION/IMPROVEMENT HARVEST*** - Small openings up to 5 acres in size would be created in the existing stand to promote regeneration and/or release established regeneration. Good seedtrees would be retained within group-select openings. Improvement cutting would be done to reduce stocking density, increase the shade-intolerant species mix, and remove trees that are at high risk for value loss and mortality.

- ***CLEARCUT WITH RESERVES*** - This treatment is prescribed in densely stocked lodgepole pine stands. Reserve trees would include vigorous trees of varying age classes of species other than lodgepole pine and large snags. Small pockets and strips of the existing stands would be retained within the harvest units to help break up the openings and create more-irregular shapes that emulate natural disturbances.

FIGURE II-1 - PROPOSED SILVICULTURAL TREATMENTS



Commercial Thinning

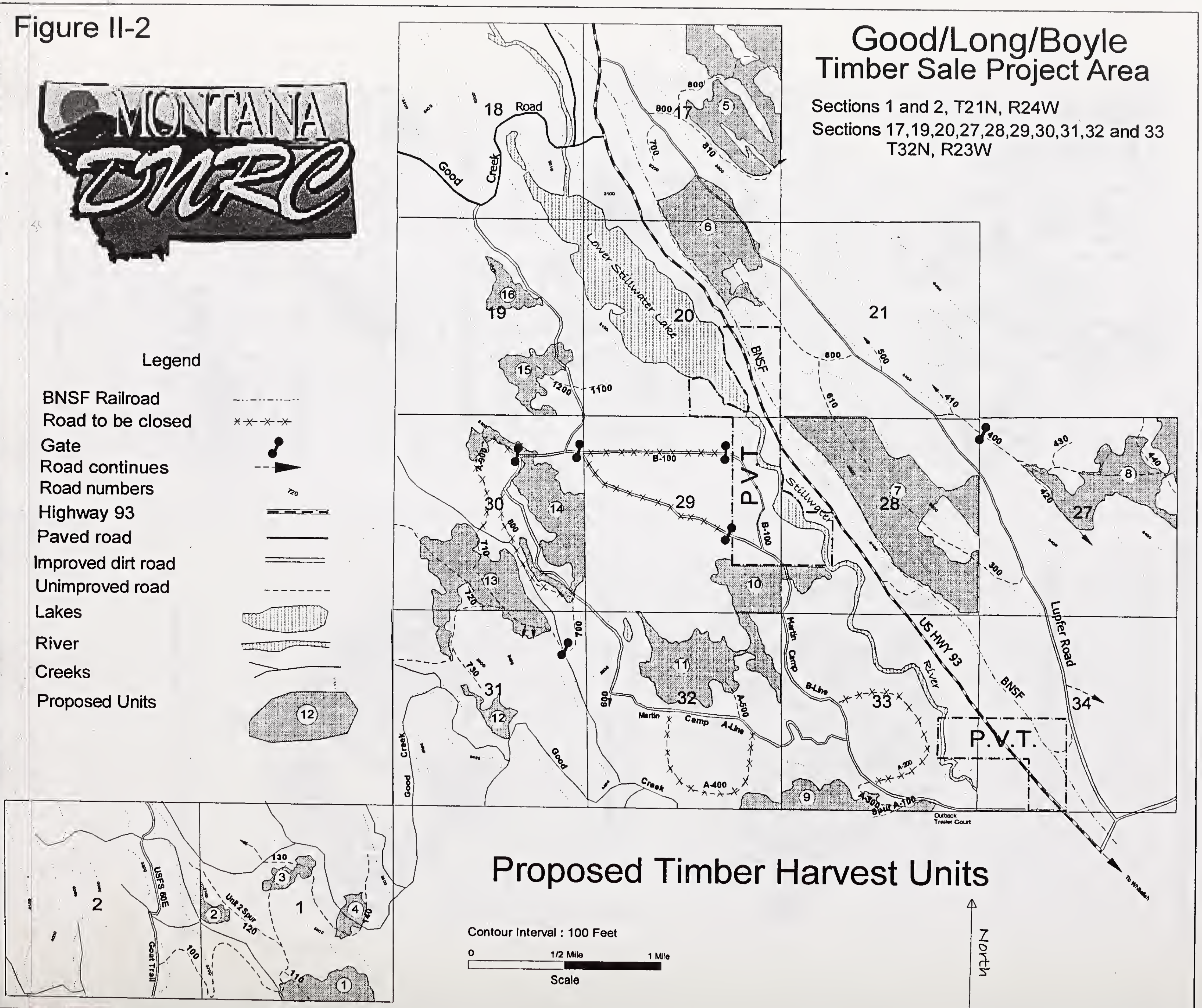
Modified Seedtree / Shelterwood with Reserves

Modified Seedtree with Reserves

Group Selection / Improvement Harvest

Clearcut with Reserves

Figure II-2



Good/Long/Boyle Timber Sale Project Area

Sections 1 and 2, T21N, R24W
Sections 17,19,20,27,28,29,30,31,32 and 33
T32N, R23W

Proposed Timber Harvest Units

SUMMARY OF ENVIRONMENTAL EFFECTS

Table II-2 summarizes the primary environmental consequences of the alternatives. The basis for the conclusions of environmental effects summarized here is discussed in more detail in Chapter IV. For a more complete understanding of the terms, quantities, and statements presented here, refer to Chapter IV.

TABLE II - 2 - ENVIRONMENTAL EFFECTS

<table>
<tr><th>RESOURCE</th><th>NO-ACTION ALTERNATIVE A</th><th>ACTION ALTERNATIVE B</th></tr>
<tr><td colspan="3"><i>VEGETATION</i></td></tr>
<tr><td colspan="3">Wildfire Hazards and Risks</td></tr>
<tr><td>Fire Fuels</td><td>No short-term change in existing levels; probable long-term increase in fire fuels.</td><td>An increase in fire fuels is expected immediately following harvesting activities; long-term risks would be reduced.</td></tr>
<tr><td colspan="3">Sensitive Plants</td></tr>
<tr><td><i>Viola renifolia</i></td><td>No short-term change in existing population.</td><td>Due to the location of the existing sensitive plant population, no change is expected.</td></tr>
<tr><td colspan="3">Noxious Weeds</td></tr>
<tr><td rowspan="2">Assume that existing budgets allow for continued contracting .with Flathead County Weed Control.</td><td colspan="2">Populations may continue to increase with increased recreational use of the area. Spot herbicide applications would reduce the spread rate of oxeye daisy, St. Johnswart, spotted knapweed, and tansy ragwort.</td></tr>
<tr><td>The amount of exposed mineral soils would not increase, therefore, no short-term increase in weed infestations would occur.</td><td>Logging and road repairs would expose soil and increase the likelihood of noxious weeds becoming established. Improvements to roads may increase the amount of recreational traffic, thereby increasing the source of weed seed spread. Proposed road closures and continued weed monitoring should help prevent an increase in the current level of noxious weeds.</td></tr>
<tr><td colspan="3">Age-Class Distribution</td></tr>
<tr><td>Effects on the landscape level (Stillwater State Forest)</td><td>No expected change in the short term.</td><td>A trend towards historic conditions would include a higher number of acres in young seral species (0-39 years old) and a lower number of acres in old-growth mixed-conifer and subalpine fir cover types.</td></tr>
</table>

RESOURCE	NO-ACTION ALTERNATIVE A	ACTION ALTERNATIVE B	
Effect to proposed harvest acres by age class:	Effect of Alternative A (same as existing)	Acres Converted	Effect of Alternative B
Seedling/sapling (0 to 39 years)	7 acres	+190	197 acres
40 to 99 years	517 acres	-55	462 acres
100 to 149 years	437 acres	-80	357 acres
Old growth (150+ years)	246 acres	-55	191 acres
Total acres:	1,207 acres	0 acres	1,207 acres
Cover-Type Distribution			
Effects on the landscape level (Stillwater State Forest)	No expected short-term change; continued trend away from desired future conditions.	A trend towards less shade-tolerant cover types and more shade-intolerant species are expected.	
Effect on cover types in proposed harvest acres (Good/Long/Boyle Project area)	Alternative A (same as existing acres) subalpine fir - 120 acres mixed conifer - 393 acres larch/D-fir - 261 acres lodgepole pine - 197 acres w. white pine - 236 acres Total - 1,207 acres	Effect of Alternative B Approximately 648 of the harvest acres would immediately convert to a western larch/Douglas-fir cover type, which would result in a reduction of 120 acres of the subalpine fir, 331 acres of the mixed conifer, and 197 acres of the lodgepole pine cover types.	
Old-Growth Representation			
Amount of Old Growth	No anticipated change within the project area.	Approximately 55 acres of old growth would convert directly to a 0-to-39-year age class.	
	At the landscape level, with other concurrent timber sales in progress, a trend would continue toward appropriate conditions by expanding the percent of old-growth western larch/Douglas-fir acres and reducing the percent of subalpine fir and mixed-conifer old-growth acres.		
Old-Growth Attributes			
Tree vigor/ decadence	Over time, tree mortality would increase and stand vigor would decrease.	Following the proposed harvest treatments, tree vigor would likely increase as a response to increased light, moisture, and growing space. Decadence would be reduced in the short term.	
Stand structure	In the absence of a large natural disturbance, shade-tolerant trees would continue to increase the level of acres with a multistoried canopy.	Proposed harvesting activities would emulate a mixed-severity fire and reduce the amount of shade-tolerant trees in the lower canopy layer. The result would be a reduction in the level of the multistoried canopy structure.	

RESOURCE	NO-ACTION ALTERNATIVE A	ACTION ALTERNATIVE B
Old-Growth Attributes (continued)		
Stocking level (volume per acre)	In the absence of fire, stocking levels would continue to increase over time.	An immediate reduction in the stocking level is expected wherever harvesting activities occur. Residual trees are expected to release as a result of harvesting; therefore, an increase in volume per acre (stocking levels) is expected over the long term following the proposed harvest.
Snags per acre	The number of snags would gradually increase over time with tree mortality.	A slight decrease in the number of snags and snag recruits is expected as a result of harvest treatments. Live snag-recruitment trees would be retained and, wherever possible, snags would be left.
Coarse down woody material	In the absence of a large natural disturbance, the amount of coarse woody debris would gradually increase over time.	Smaller diameter coarse woody material would increase appreciably due to the residual material committed for soil-nutrient recycling in DNRC timber sale contracts. Removing unhealthy trees that are predisposed to disease may reduce the potential for that same number of trees to end up as coarse down woody material.
Large live trees	No change expected in the short term.	The largest and oldest seral trees would be retained with the proposed harvest treatments; large shade-tolerant species and species that are not resistant to fire would be appreciably reduced in order to reduce stocking levels and manipulate existing cover types. The number of trees over 21 inches diameter at breast height (DBH) would not substantially change.
AIR QUALITY		
Smoke from fuel hazard reduction	No change in existing levels is expected.	Increased smoke from slash-burning operations would have short-term negative effects on air quality, but would not exceed the maximum allowable levels as defined by the State of Montana Cooperative Smoke Management Plan.
Road dust	No change in existing levels is expected.	Road dust is expected to increase from harvesting activities that take place during summer and fall. Dust abatement will be applied when necessary.

RESOURCE	NO-ACTION ALTERNATIVE A	ACTION ALTERNATIVE B
AESTHETICS/VISUALS		
Scenic viewpoints	Minor changes to area visuals are expected barring large-scale natural disturbances.	Approximately 308 acres would be significantly altered through harvesting activities, resulting in some short-term negative visual impacts. This effect would be softened by the regeneration of trees, shrubs, and grasses within 5 to 10 years. The hiding-cover buffer used to protect wildlife would also serve as a visual buffer to screen harvesting activities from open roads.
ROADS/TRANSPORTATION		
Road use	Road traffic would likely increase as a result of the expanding number of people living and recreating in Flathead Valley.	Road use would likely increase due to the expanding population in Flathead Valley. Road use would decrease where segments of road are closed or restricted with this project.
Maintenance costs	See development costs under ECONOMICS.	
ECONOMICS		
Development costs	No immediate road improvements would be implemented without a timber harvest; however, the West Fork bridge must be replaced eventually.	An estimated sale-development cost of $180,000 would include the replacement of the West Fork bridge ($120,000) and miscellaneous BMPs required on proposed haul routes within the project area.
Forest improvement (FI) fee	No FI dollars would be collected without harvesting timber.	Approximately $236,552 in FI money ($46.41 per MBF) would be collected during the proposed timber harvesting activities.
Total value of benefit to State lands from stumpage dollars, FI, and development.	N/A	$1,434,360
Estimated minimum bid ($/MBF)	N/A	$200
Total timber dollars returned to the trust	N/A	$1,015,800
Jobs and income	No timber-harvesting-related jobs or income would be provided from this proposed alternative.	Potentially, 10.58 direct jobs are provided per MBF harvested, for an average annual income of $31,866.35 per job (based upon regional estimates for northwest Montana).

RESOURCE	NO-ACTION ALTERNATIVE A	ACTION ALTERNATIVE B
ECONOMICS (continued)		
Other sources of revenue	Due to population expansion, the number of people recreating on state lands within and adjacent to the project area are expected to increase, regardless of whether or not timber harvesting takes place.	
HYDROLOGY		
Water Yield		
Good Creek Watershed - 56,542 total acres		
– Approximate increase in equivalent clearcut acres (ECA):	None	148 Acres
– Percentage of increase in annual water yield:	None	1%
– Current water yield increase above natural levels (threshold is 14%):	8%	8.1%
	Water yield increase above natural levels may reach 10% by 2007 from activities associated with the USFS Good Creek Resource Management Project.	
Long Meadow Watershed - 4,371 total acres		
– Approximate increase in ECA:	None	23 acres
– Percentage of increase in annual water yield:	None	.2%
– Current water yield increase above natural levels (threshold is 14%):	11%	11%
	Water yield increase above natural levels would likely decrease as vegetative cover increases.	
Stillwater River Watershed - 110,000 total acres		
– Approximate increase in ECA:	None	573 Acres
– Percentage of increase in annual water yield:	None	.2%
	Water yield increase data is not currently available due to the size of the watershed.	
FISHERIES		
Westslope cutthroat trout/bull trout	No measurable change expected	

RESOURCE	NO-ACTION ALTERNATIVE A	ACTION ALTERNATIVE B
SOILS		
The maximum harvest area that could be affected by soil compaction or displacement:	0%	15%
The maximum acres of soil that could be impacted:	0	143 acres
WILDLIFE		
Coarse filter for the habitat of all species	Forest conditions would continue to trend towards climax, benefitting species that require shade-tolerant and closed-canopy forest types for all or part of their habitat. A decrease in habitat is expected for those species that require seral forest types for all or part of their habitat.	Wildlife species that require open canopies, large amounts of understory, and shade-intolerant tree species for all or part of their habitat would benefit from the proposed harvesting alternative. Conversely, species for whom lodgepole pine and subalpine fir habitats play an important function, would be negatively affected by the loss of multistoried or closed-canopied forest types.
Threatened and Endangered Species		
Bald Eagle		
Direct effects	The current rate of human disturbance would continue.	Possible disturbance to the nest site, feeding areas, or perch sites from increased timber harvesting traffic near Units 10, 11, 14, or 15.
Habitat	No direct impacts are expected.	No changes within the established nesting area. Effective road closures may produce possible benefits. Increased road closures and seasonal restrictions may provide benefits to nesting eagles.
Grizzly Bear		
Direct effects	No direct impacts are expected.	Possible disturbances from increased road traffic, noise, and human activity associated with timber harvesting in Units 5, 6, 7, and 8 (part of the Lazy Creek Grizzly Bear Subunit).

RESOURCE	NO-ACTION ALTERNATIVE A	ACTION ALTERNATIVE B
Grizzly Bear (continued)		
Habitat - Effects to existing hiding cover (13,393 acres) within Lazy Creek Subunit:	No direct impacts expected.	Harvesting in Units 5, 6, 7, and 8 would reduce the level of hiding cover by approximately 597 acres, resulting in 12,796 acres of postharvest cover (see Chapter IV for expected cumulative effects of ongoing timber sales throughout the BMU).
POR = Percent of open-road density (% of Lazy Creek Bear Management Subunit with greater than 1 mile of road per square mile of land):	46% (existing)	47% (during harvesting activities) 46% (after harvesting takes place)
PTR = Percent of total-road density (% of Lazy Creek Bear Management Subunit with greater than 2 miles of road per square mile of land):	71% (existing)	72% (during harvesting activities) 71% (after harvesting takes place)
Northern Rocky Mountain Wolf		
Direct effects	No change in present level of disturbance to wolves.	
Habitat	Possible increase in prey due to increased summer thermal cover as forest canopies close in. High road densities would continue to limit wolf use.	Road closures may increase security for wolves and prey, but not appreciably. The reduction in thermal cover and increase in forage after harvesting occurs, may reduce wolf prey (deer populations), thereby limiting wolf use of the area.
Sensitive Species		
Fishers		
Direct effects	No change.	No significant impacts expected.
Habitat	No change.	Minimal impacts due to harvesting buffers in areas identified as fisher habitat.
Harlequin ducks		
Direct effects/habitat	No expected change in existing condition.	

RESOURCE	NO-ACTION ALTERNATIVE A	ACTION ALTERNATIVE B
Pileated Woodpecker		
Direct effects	No immediate change.	Approximately 313 acres of the intermediate canopy would be removed; most of the dominant structure and snags would be retained.
Habitat	Short-term increase in habitat. Some decline expected over time without replacement trees.	Some quality nesting habitat is expected to be reduced in the absence of midstory canopy cover. Feeding sites (large diameter serals) would be retained and improve over time as large serals and young seral ingrowth increase in size.
Big game (elk, moose, white-tailed deer)		
Direct effects	Less forage and more thermal cover over time as canopy closure increases.	Proposed timber harvesting would result in an increase of forage at the expense of the thermal cover decreasing.
Habitat:		
- Expected effect on winter thermal cover within the project area:	1,928 existing acres	1,423 acres
- Expected effect on summer thermal cover within the project area:	1,123 existing acres	737 acres
- Expected effect on big game hiding cover within the project area:	5,785 existing acres	4,646 acres

GOOD/LONG/BOYLE TIMBER SALE PROJECT

CHAPTER III

EXISTING ENVIRONMENT

ENVIRONMENTAL CHARACTERISTICS, ANALYSIS AREAS, AND ANALYSIS METHODS

INTRODUCTION

Chapter III contains information about the environment of Stillwater State Forest and the Good/Long/Boyle Timber Sale Project area as it relates to the issues associated with this proposed project. Each resource analysis requires examination from a different geographic scale; as an example, the watershed analysis considers impacts on a much larger acreage than the analysis for sensitive plants or noxious weeds. The vegetation section of Chapter III includes details of the current condition of the proposed harvest units and adjacent stands, as well as the cumulative effects from past timber harvesting, fire suppression, and known natural disturbances. The vegetation section is followed by a current condition description of air quality, aesthetics, roads and transportation, economics, water quality, fisheries, soils, and wildlife.

PROJECT AREA DESCRIPTION

The Good/Long/Boyle Timber Sale Project area, comprised of 7,920 acres across 13 sections, is located within several watersheds or hydrologic units. The proposed harvest areas of the Good/Long/Boyle Timber Sale Project are scattered throughout the Stillwater River, Good Creek, Evers Creek, and **Long Meadow** drainages. The Stillwater River and U.S. Highway 93, which parallels the river, divides the project area in two. Good Creek flows through the southwest corner of the project area and joins Stillwater River downstream from the Good/Long/Boyle Timber Sale Project. The Stillwater River continues flowing northwest to southeast, eventually flowing into Flathead River.

The local topography is characterized by gently rolling ground that ranges between 3,000 and 3,500 feet in elevation. Recorded annual precipitation averages 20 inches per year. The area is heavily forested with lodgepole pine, subalpine fir, and western larch/Douglas-fir cover types. Flathead National Forest (FNF), Plum Creek Timber Company, and small private landowners surround the main project area.

In order to address the replacement of the West Fork bridge, a smaller disjunct project area (the existing crossing) will be included as part of this analysis *(refer to Stillwater State Forest Map, Appendix B)*.

VEGETATION

The vegetation section provides a detailed description of the present condition for the following resource management issues:

- insects and diseases
- past management activity
- habitat types
- forest fire history and its role in natural stand conditions
- sensitive plants
- noxious weeds
- forest cover types, age-class distribution, and patch characteristics
- old-growth commitments

In order to understand how each issue was addressed, it is important to understand the geographical analysis area and the methods of analysis. These are described in the following Landscape Analysis section.

LANDSCAPE ANALYSIS

Background

The SFLMP directs DNRC to take a coarse-filter approach to biodiversity by favoring an appropriate mix of stand structures and compositions on State land *(Montana DNRC 1996)*. To implement a coarse-filter approach and meet SFLMP directives, landscape analysis techniques were used to determine an appropriate mix of stand structures and compositions, including forest cover-type representation, age-class distribution, and structural characteristics.

Analysis Methods

This landscape analysis will view some components, such as cover type representation from varying spatial scales. The analysis will also compare historic conditions and desired future conditions that are believed to be appropriate for the site occupied by stands in the analysis area.

Inventory data from the 1930s was used in *Losensky's 1993* data to estimate the proportion of various stand-structural stages by cover type as they were historically represented throughout the Inland Northwest. This provides an estimate of the natural characteristics of forests prior to fire suppression and extensive logging. Losensky (1997) has worked with DNRC to complete an analysis for the entire State; some vegetation types that are specific to that work are included in this analysis.

The protocol used to assign cover types using the Stillwater Unit's stand level inventory (SLI) is explained in detail in the SFLMP Biodiversity Guidance. Database cross-tabs and tables that were used in the analysis are in the project file. The SFLMP Biodiversity Guidance and database are available at the Stillwater State Forest office in Olney.

Analysis Area for Vegetation

The vegetation analysis includes 3 geographic scales:

- Historic conditions for cover type, age, and old-growth proportions refer to those from Climatic Section 333C, which represent the Upper Flathead Valley *(Losensky 1997)*.

- Current and appropriate conditions for cover type, age, and old-growth were analyzed on the scale of the entire contiguous Stillwater State Forest and scattered parcels of land located across 20 sections in townships 33N, 34N, 35N and 36N. These scattered parcels of land, located north and west of the contiguous Stillwater State Forest, are administered by Stillwater Unit. An SLI has recently been completed on these scattered parcels and the database has been updated to include them. There is approximately 98,195 acres of forested land in this analysis area. Nonforest acres in lakes, ponds, wetlands, grazing land, and natural meadows were subtracted from the land base wherever percentages of forested acres have been calculated for this document.

- Sensitive plants, wildfire history, noxious weeds, past harvesting activities, insect and disease disturbances, and stand conditions will be analyzed at the harvest-unit scale.

SLI data is continuously updated to include changes where recent harvesting activities have taken place. This update process provides DNRC foresters with the best available data for the required analysis on proposed management activities. Where current and future timber sales have not yet received a postharvest inventory, probable effects are taken into consideration to address cumulative impacts in each analysis area.

Two timber sale projects, Beaver Lake and Chicken/Werner, in the analysis area are in the process of being sold, but have not been harvested. Also within the analysis area are 3 proposed timber sales where initial planning and development is taking place concurrently with the analysis of this sale. The estimated effects of these projects on cover types, age-class, and old growth will be considered in the cumulative effect analysis in Chapter IV. *(Refer to Stillwater State Forest Map, Appendix B and List of Related Environmental Reviews, Appendix D.)*

EXISTING CONDITION OF THE PROJECT AREA

Forest productivity in the Good/ Long/Boyle Timber Sale Project area is rated moderate to high. Growth is limited by moisture, the relatively short growing season, and scattered frost pockets. The forest areas on the west side of Stillwater River have been heavily influenced by the fire activity in the 1900s. The understories are open and are primarily stocked with western larch, lodgepole pine, Douglas-fir, Engelmann spruce, and some aspen. The stands east of Stillwater River are the more dense forest types with heavier understory vegetation and a high level of shade-tolerant tree species. The cover types are predominantly mixed conifer comprised of subalpine fir, grand fir, Engelmann spruce, Douglas-fir, western larch, western white pine, and lodgepole pine. A scattered representation of western red cedar and ponderosa pine occurs throughout the project area.

INSECTS AND DISEASES

Stand structure and variability of tree-size classes have been heavily influenced by past natural disturbances and harvest treatments. Insect and disease conditions in the forest include stem decays (primarily in subalpine fir, but associated with all other tree species) and root diseases (primarily in Douglas-fir, grand fir, and subalpine fir). The Douglas-fir bark beetle is responsible for the recent mortality of trees within the project area; future mortality is expected. The mountain pine beetle attacks are still occurring, but have slowed considerably since the epidemic of the 1980s. Western white pine is still affected by blister rust, but some healthy individual trees appear to have resistance to the disease. Dwarf mistletoe is found in pockets of western larch and lodgepole pine throughout the project area; however, the level of infestation is tolerable and probably does not exceed the historic levels of occurrence. A range of other stem decays, foliar pathogens, and insect infestations influence the variability of the stand structures and size classes represented in the project area.

PAST MANAGEMENT ACTIVITIES IN THE PROJECT AREA

Historical data records provide forest health and economic status for the project area dating back to 1910. The early field notes indicate that the area was thought to have low agricultural value and marginal timber value due to the fires of 1910, 1916, 1918, and 1926. Recorded logging activities began in 1913 to salvage timber from the 1910 fires. Timber was harvested from every portion of every section within the project area between 1913 and 1945. Some of these harvests were part of a planned western larch tie-log sale, but the greater majority were set up to salvage fire-killed trees or regenerate stagnant lodgepole pine stands.

The sawlog volume harvested from the overall project area between 1920 and 2000 is 65 MMBF, with most of the harvesting occurring in the 1920s and 1930s. Other forest product sales, including firewood and Christmas tree harvesting, have also occurred in the area. *(Refer to List of Related Environmental Reviews, Appendix D.)*

The large wet meadows and ponds (including Lake House Meadow) have recorded permits for grazing leases and hay mowing throughout the 1930s. These activities may have continued into the 1940s and 1950s, but are not mentioned in the records.

As a result of the early fire and logging history, much of the project area is stocked with a younger age class of seral-type species. A high percentage of forested acres on the west side of the project area are suppressed stands of small-diameter lodgepole pine or mixed conifers. Early fires and logging resulted in very productive forest stands across the river on the east side of the project area. Some of those stands are stocked with fast-growing even-aged Douglas-fir and western larch. A reduction of growth and vigor is expected as canopies close and stands become overstocked.

The Plum Creek lands to the east have been managed, primarily, for timber production over several decades. The forested stands on Plum Creek ownership are similar to the forest types within the project area, with the same mix of conifer species. The average stand stocking levels and volume per acre are generally lighter due to harvesting activities that have occurred over the last 2 decades. Most of the adjacent private landowners with small holdings have also harvested timber in the last 10 years.

West and south of the Good/Long/Boyle Timber Sale Project area, the USFS land is managed by FNF's Tally Lake Ranger District. This land contains several thousand acres of advanced regeneration resulting from past harvesting activities and fires. The same fires that burned across Stillwater State Forest early in the last century also burned much of these USFS lands.

HABITAT TYPES IN PROPOSED HARVEST AREAS

Forest habitat types *(Pfister et al, 1977)* are used to describe the potential vegetation of a site. The forested acres proposed for harvesting in the Good/Long/Boyle Timber Sale Project area are composed of 49% ABLA series (subalpine fir type), 29% ABGR series (grand fir type), 20% PICEA series (Engelmann spruce type), and 2% PSME series (Douglas-fir type). The habitat types have been further grouped to indicate the severity and frequency of wildfires that historically occurred on a site (*INT 223, Fisher and Bradley, 1987*).

WILDFIRE HAZARDS AND RISKS IN THE GOOD/LONG/BOYLE TIMBER SALE PROJECT AREA

Historic wildfire activity was summarized earlier in this chapter under *Past Management Activities in the Project Area*. Several consecutive burns in the early 1900s are responsible for the current stand densities and tree species in the project area. FNF's Tally Lake Ranger District, USFS, included a detailed analysis of local fire history and suppression that dates back to the 1300s in the recently released Good Creek Resource Management Project Final Environmental Impact Statement. For more information, refer to this publication, which is available at local libraries, Tally Lake Ranger District, or in the project file at the Stillwater State Forest office at Olney.

Information on fire groups of habitat types and fire's role in forest succession is presented in technical report, Fire Ecology of Western Montana Habitat Types *(INT 223; Fisher and Bradley 1987)*. The report includes fire-frequency data for the habitat groups in each climate type as was mentioned in, *Habitat Types in Proposed Harvest Areas* earlier in this chapter.

The Good/Long/Boyle Timber Sale Project area consists of the moist (87%) and the dry (13%) climate types.

The dry climate type, Fire Group 8, is also a lower-elevation subalpine habitat type in the spruce/subalpine series. Douglas-fir and lodgepole pine are usually dominant serals in Fire Group 8 where the occurrence of periodic low-to-moderate-severity fires favored the serals and prevented the invasion of shade-tolerant firs and Engelmann spruce in the understory.

The moist climate type is listed as Fire Group 9 and has a mean stand-replacement fire frequency of 128 years *(Sneck 1977)*. The moist-climate areas are lower-elevation subalpine fir habitat types and the dominant serals are usually composed of spruce, Douglas-fir, lodgepole pine, and western white pine. The soils are often saturated with water and long intervals between fires allow duff and understory vegetation to build to such a level that few trees survive the effects of fire. Fire effects are long lasting on the moist Fire Group 9 sites.

In conclusion, fire suppression has probably not influenced the area of Good/Long/Boyle as much as other parts of Stillwater State Forest because a hot fire burned much of the area in the last century. Portions of the project area that were burned might not be as densely stocked if low-intensity ground fires had been permitted to burn naturally. On the same hand, areas of the project that escaped the fires of 1910, 1916, 1918, or 1926 may be prime targets for a natural wildfire in upcoming years.

SENSITIVE PLANTS IN THE PROJECT AREA

Contract botanists have been hired by DNRC to perform several surveys throughout the analysis area. Information from those surveys has been submitted to the Montana Natural Heritage Program in Helena. Montana Natural Heritage Program has also conducted their own surveys within the analysis area. A complete list of Montana plant species of special concern and an update on their status is available at the Montana Natural Heritage Programs web site at: http://orion2.state.mt.us/mtnhp/plants.html

During past surveys, sensitive plant populations have been predominantly found in the moist habitat types found along streams and wetlands. For this project, additional information regarding sensitive plant populations and locations was obtained in the recent report titled, Ecologically Significant Wetlands in the Flathead, Stillwater, and Swan River Valleys *(Jack Greenlee, June 1998)*. Two sites identified as 'ecologically significant' are found within the boundaries of the Good/Long/Boyle Timber Sale Project area:

- the tributary of Good Creek located in the center of Section 30, T32N, R23W, and

- Lake House Meadow located in the northeast corner of Section 28, T32N, R23W.

The tributary of Good Creek is a series of beaver ponds and swamps that form a terraced wetland. A rare wet spruce community (spruce/ skunk cabbage) is found along the perimeter of the wetland. A population of rare plants, the kidney-leafed violet *(Viola renifolia)*, was identified at the site; however, a floristic inventory is required during spring to fully assess the population.

Lake House Meadow is a cluster of 3 long, narrow wetlands without apparent inlets. No rare plant communities were found on this site; however, the invasive reed canary grass *(Phalaris arundinacea)* is well established and threatens to displace native sedges.

NOXIOUS WEEDS ON THE PROJECT AREA LEVEL

The Flathead County Weed/Parks District has conducted several surveys and weed spraying projects in the Good/Long/Boyle Timber Sale Project area. DNRC paid for the survey and weed spraying through funds obtained from past timber sale FI fees and Recreational Use License sales. Localized populations of spotted knapweed, St. Johnswort, and oxeye daisy were found along roadsides. Also identified were 3 locations of tansy ragwort. The Lupfer area of the project has been sprayed 3 times, while the Martin Camp area has been sprayed just once.

The weed district sprayed the identified weeds with clopyralid (Transline) and water, as well as a mixture of picloram (Tordon 22k), surfactant, and water. This treatment would need to be repeated for several consecutive years in order to be certain of long-term weed control.

Given the open-road status of the Lupfer and Martin Camp roads, a potential for weed seed dispersal from public traffic exists in the project area. The project area is part of an ongoing program to control the infestation or spread of weeds.

AGE CLASS

Age-class distributions delineate another characteristic important for determining average historical, or appropriate, conditions. When distributions are combined with information on cover types, a fairly clear picture emerges over time of the average forest conditions. Knowledge about local topographical effects, ecological characteristics of tree species, climatic vegetation relationships, and disturbance regimes adds clarity to the picture of appropriate conditions.

The 1930s' inventories quantified the ages of the forest stands. To arrive at age estimates, Losensky examined the data and projected the stands back in time to the early 1900s. This data is useful in setting baseline conditions for determining the extent to which current forest age-class distribution deviates from average historical conditions.

Comparing the entire Stillwater State Forest with historical data from the Upper Flathead Valley, *Figure III-1* shows that Stillwater State Forest is low in stands of the seedling/sapling age class and higher in stands that are in the 40-to-99-year and older age classes.

Age-Class Distribution in Proposed Harvest Unit Area

The proposed Good/Long/Boyle Timber Sale Project harvest areas are relatively small and, given the large size of a natural disturbance, should be viewed to simply show the age/class representation at this level. *Table III-1* summarizes the actual acres by age class found in the areas proposed for harvesting.

FIGURE III-1

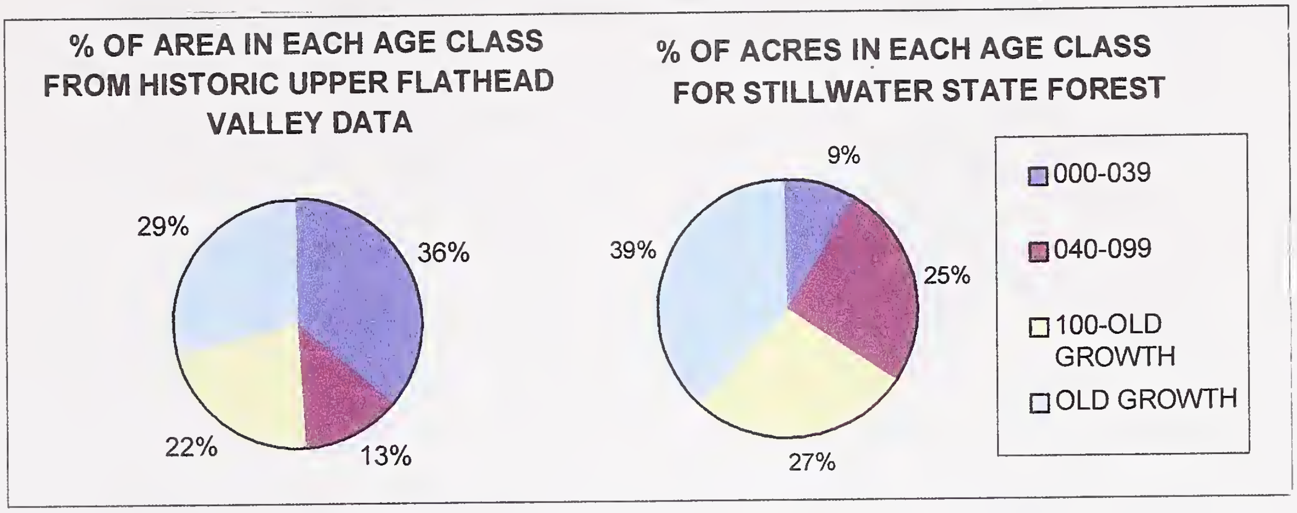


TABLE III-1 - AGE-CLASS DISTRIBUTION IN THE PROPOSED HARVEST UNIT AREA (TIMBST99 Database Information)

PROPOSED HARVEST ACRES IN THE PROJECT AREA	NONSTOCKED/ SEEDLING/SAPLING (0-39 YEARS)	POLES (40-99 YEARS)	MATURE (100-149 YEARS)	OLD GROWTH (150+ YEARS)
Current number of acres by age class	7	517	437	245
Percent of total harvest acres in each age class	1%	43%	36%	20%

The proposed harvest acres are made up predominantly of pole-sized stands that regenerated after the fires of the early 1900s. Mature stands of 100-to-149-year-old trees make up 36% of the acres proposed for harvesting. Many of these stands have an overstory of mature timber that survived the fires, while a younger age class of pole-sized white woods make up the understory. The last age-classification category is old growth; 20% of the proposed harvest acres falls into the 150+-year age class.

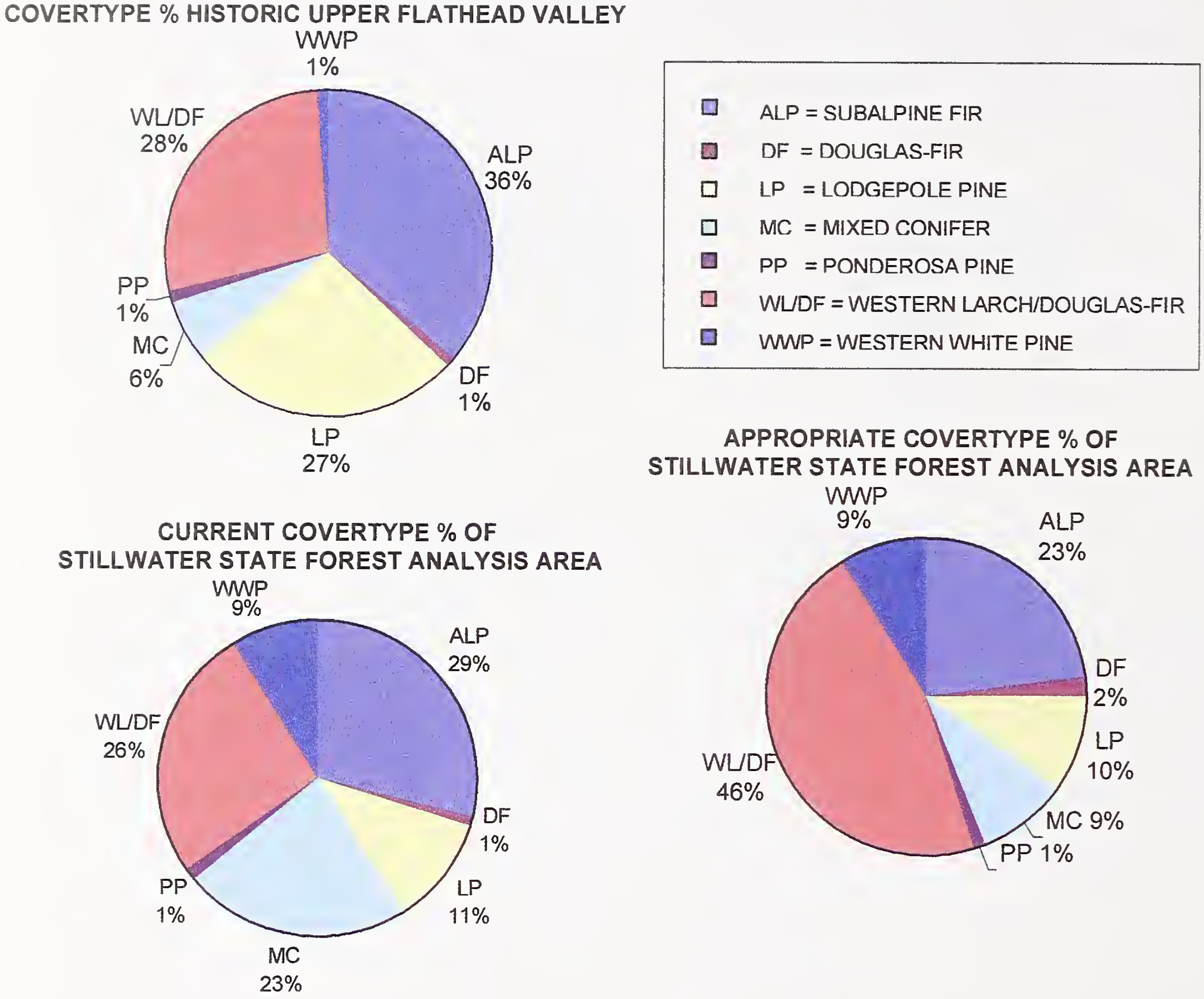
COVER TYPE

Cover-Type Representation for the Analysis Area (landscape-level coarse filter)

Figure III-2 illustrates the percentage of forested ground that is/was occupied by a particular cover type. The comparison shown includes the Upper Flathead Valley historic data and current and appropriate conditions on the scale of the analysis area.

Data indicates, as illustrated by *Figure III-2*, that mixed-conifer stands are currently overrepresented in reference to both historic conditions and conditions that DNRC feels would be appropriate by using historic data. Many of the species that make up the mixed-conifer cover type are shade tolerant and increase

FIGURE III-2


COVERTYPE % HISTORIC UPPER FLATHEAD VALLEY

CURRENT COVERTYPE % OF STILLWATER STATE FOREST ANALYSIS AREA

APPROPRIATE COVERTYPE % OF STILLWATER STATE FOREST ANALYSIS AREA

in the species component of stands as the interval between disturbances, such as wildfire, is lengthened.

The western larch/Douglas-fir and lodgepole pine cover types are currently underrepresented on the forest in reference to historic data; western larch and lodgepole pine are not shade tolerant and the species have, historically, been perpetuated through fairly intensive disturbances, such as wildfires. This data sort indicates that the current amount of the western white pine cover type is similar to what occurred historically; however, the white pine blister rust infection has drastically affected the western white pine. In reality, the number of healthy western white pine that occupy the canopy as overstory dominants has been on the decline across most of the Pacific Northwest for several decades; the Good/Long/Boyle Timber Sale Project area is no exception.

Cover-Type Representation in Proposed Harvest Unit Area

Table III-2 illustrates the cover type and amount of acres proposed for harvesting in that cover type for the Good/Long/Boyle Timber Sale Project area. There are very few ponderosa pine. Harvest history records indicate that 17% of the board-foot volume removed from this area has been ponderosa pine (harvested predominantly during the

TABLE III-2 - COVER TYPES OF THE GOOD/LONG/BOYLE PROPOSED HARVEST UNIT AREA

COVER TYPE	*ACRES*	PERCENT OF PROPOSED HARVEST ACRES BY COVER TYPE
Subalpine fir	120	10
Douglas-fir	0	0
Lodgepole pine	197	16
Mixed conifer	393	33
Ponderosa pine	0	0
Western larch/Douglas-fir	261	22
Western white pine	236	19
Total	1,207	100

1920s and 1930s). Based on this knowledge, it may be safe to assume that the Good/Long/Boyle Timber Sale Project area would have a small number of acres in ponderosa pine cover types under natural conditions. Currently, the mixed-conifer cover type dominates the portion of the project area that has been proposed for harvesting.

Summary of Age-Class and Cover-Type Representation

Generally, forest cover types within the project area are typical of those found throughout Stillwater State Forest. One objective of DNRC is to manage for cover types and age classes representative of those that existed historically. As may be seen in *Figures III-1 and III-2,* the Historic Upper Flathead Valley was more heavily comprised of young seedling/sapling stands with a lodgepole pine or western larch/ Douglas-fir cover type than the current condition in the analysis area.

PATCH CHARACTERISTICS

Historically, wildfire, the most prevalent natural-disturbance mechanism, created mosaics of vegetation patches of varying age classes and cover types. Today the forest pattern is the result of large-scale historic fires and small-scale harvesting activities. Decades of incremental harvests have diversified the larger natural burn patterns, resulting in smaller, more numerous patches across adjoining ownership.

Because historic wildfires were often larger than the Good/Long/ Boyle Timber Sale Project area, this patch analysis encompasses the analysis area rather than the project area itself. The current mean patch size over all cover types and age classes on Stillwater State Forest and scattered sections is approximately 107 acres. This patch size is considered smaller than that historically present in this area, or prior to 1900.

More detailed information on patch size and shape is found in the project file at the Stillwater State Forest office in Olney.

OLD-GROWTH REPRESENTATION

Background and Analysis Methods and Areas

- ***Background***

  The SFLMP states that DNRC would seek to maintain or restore old-growth forests in amounts of at least half the average proportion, which would be expected to occur with natural processes on similar sites *(MT DNRC 1996)*. Old growth must be retained not only in the amounts committed to, but in appropriate proportions and sites across the landscape.

- ***Analysis Methods***

DNRC approaches the issue of old-growth retention from the perspective that the characteristics of old-growth stands that make them functionally different from other stands should be defined and managed for.

Although no estimates of historic amounts of old growth are available, there are estimates of historic age-class distributions and accompanying estimates of proportions of old stands. This information is available from a forest inventory conducted in the 1930s across western Montana. Losensky (1997) summarized the 1930s' inventory showing proportional age-class distributions by climatic section. The proportion of old stands within a given analysis area compared to the climatic section proportion from the 1930s' inventory is DNRC's numeric criterion for assessing compliance with our commitment to retaining a minimum of 50% of old-growth amounts that would be expected to occur with natural processes on similar sites. DNRC will assess the structural attributes associated with old age that characterize the variety of forest conditions that would have naturally occurred on the landscape. This will be done to the degree that data is available, both on the project level and over the entire analysis area.

- ***Analysis Areas***

The 3 scales of analysis described previously for vegetation will also be used for analyzing old growth.

OLD-GROWTH COMMITMENTS

For this analysis, stands with a substantial overstory component of 150 years old and older and at least 4 MBF per acre are considered old-growth stands. The exceptions are lodgepole pine stands, which were sorted as old stands if they were 139 years old or older. This working definition will encompass both stands with high and low levels of old-growth attributes and does not determine the quality and value of these stands as wildlife habitat for old-growth-associated species or other functions of old stands. Old growth is analyzed for these other characteristics specifically in the Vegetation and Wildlife sections of the project-specific environmental analysis. *Table III-3* shows that approximately 37,811 acres, or 38% of the analysis area, is currently considered old growth. Historic data from the Upper Flathead Valley indicates that old-growth stands occupied approximately 29% of the area. Proportions of old-growth acres on Stillwater State Forest exceed the one-half historic commitment in all cover types with the exception of the ponderosa pine cover type, which is approximately 83 acres below the minimum.

DESCRIPTION OF THE CURRENT DISTRIBUTION OF OLD-GROWTH STANDS ON STILLWATER STATE FOREST

Table III-3, column 3 shows that the analysis area has approximately 2.3 times as many old-growth acres as DNRC has commitment to retain in the analysis area. In an effort to ensure that the old-growth that provides habitat for old-growth-associated species is maintained, the analysis also looks at the old-growth spatial arrangement, which is helpful in developing and refining alternatives on the project level, as well as analyzing the effects of a proposed action. The current combination of old-growth stands can be viewed as a whole to help in planning. We fully expect that future project-level development,

TABLE III-3 - CURRENT AMOUNT OF OLD GROWTH BY COVER TYPE IN THE ANALYSIS AREA COMPARED TO MINIMUM RETENTION LEVELS USING THE METHODOLOGY DEVELOPED IN THE BIODIVERSITY GUIDANCE FOR THE SFLMP (STWE-OGI DATA BASE 3/9/2000)

LOSENSKY TYPE	MINIMUM OLD-GROWTH RETENTION ACRES	CURRENT OLD-GROWTH RETENTION ACRES	DIFFERENCE BETWEEN CURRENT AND MINIMUM ACRES OF OLD GROWTH
Ponderosa pine	302.51	219.4	83.11 (below)
Douglas-fir	50.71	272.9	222.19 (above)
Western larch/ Douglas-fir	10,530.16	11,304.8	774.64 (above)
Lodgepole pine	250.41	253.3	2.89 (above)
Western white pine	771.30	6,367.4	5,596.10 (above)
Mixed conifer	1,911.29	8,900.8	6,989.51 (above)
Subalpine fir	2,289.82	10,492.2	8,202.28 (above)
Totals:	16,106.20	37,810.8	21,704.50 (acres retained above minimum)

new information, and more extensive on-the-ground reviews of stands that currently are being identified as old growth will alter the current combination of old-growth stands on Stillwater Unit.

Timber stands that currently meet DNRC's working definition of minimum old growth on the main block of Stillwater State Forest are, in general, well distributed from north to south and east to west. Connectivity from north to south is, generally, continuous. The exception is a gap in the upper reaches of the Stillwater River drainage, where a large patch of lodgepole pine was established following a large fire in the 1920s. This patch of lodgepole pine separates some of the northernmost old-growth stands from the rest of the forest's old growth. The following proportions of old-growth stands are found in the following elevation ranges:

- 37% at 3,000 to 3,900 feet
- 26% at 4,000 to 4,900 feet
- 22% at 5,000 to 5,900 feet
- 15% at 6,000 to 7,000 feet

The largest contiguous blocks of old-growth stands are in the Swift Creek drainage, which have a higher proportion of the western white pine, subalpine fir, and mixed-conifer cover types than those located in the Stillwater River drainage. The old-growth stands in the Stillwater River drainage have a higher proportion of the western larch/Douglas-fir cover types. Generally, old growth on the west side of Stryker Ridge is more scattered in comparison with the east side.

Individually, the largest old-growth stands are from 300 to 334 acres in size and are comprised of mixed-conifer and western white pine cover types. Historically, stands that consisted of predominantly western red cedar were located in and along riparian areas. The western red cedar cover type represented only minor amounts of the region *(Losensky, 1993)*. Because the western red cedar cover type is considered an important riparian vegetation type, Stillwater State Forest's old-growth stands where western red cedar predominates were examined. Currently, 8 old-growth stands have a large percentage of western red cedar in the overstory, the largest stand being approximately 45 acres in size. Approximately 3,515 acres of timber stands that meet DNRC's minimum old-growth definition are located on scattered sections north and west of the main Stillwater State Forest within the analysis area. These stand are comprised primarily of western larch/Douglas-fir (73%) and mixed-conifer (18%) cover types. Most are at lower elevations, from 2,500 to 4,400 feet. These stands are on scattered parcels of State ownership; the largest stand is approximately 199 acres. The State ownership on these scattered sections is, generally, on warmer drier sites than most of the analysis area and contains the bulk of the analysis area's ponderosa pine cover types, including 188 acres of old growth.

OLD-GROWTH ATTRIBUTES IN THE GOOD/LONG/BOYLE TIMBER SALE PROJECT AREA

This section will display the current conditions of old-growth stands in the Good/Long/Boyle Timber Sale Project area. An assessment of large live trees, coarse woody debris, and snags was made during a walk-through inventory of old-growth stands in the project area. Stands that had a high level of old-growth attributes or other valuable characteristics and were adjacent to major riparian areas and other old-growth stands were deferred from harvesting. As mentioned earlier in Chapter II, all old-growth western larch/Douglas-fir cover types were deferred from harvesting in order to maintain and/or increase the number of acres in that age class in that cover type.

Approximately 245 acres that would be entered with the timber-harvesting treatments under Action Alternative B meet DNRC's minimum working definition for old-growth forests. The old-growth stands proposed for treatment have all been entered with past timber-harvesting treatments and the amount of large live trees, snags, vigor, and other attributes vary by stand. *(Refer to Table III-4 and the following individual attribute details.)*

Attributes that often characterize stands in the latter stages of development include:

- tree vigor/decadence
- stand structure
- stocking level (volume per acre)
- snags per acre
- coarse down woody material
- large live trees

- **Tree Vigor/Decadence**

  One of the more valuable characteristics that quantify an old-growth stand is the amount of decadence in the older vegetation on the site. Indicators of this include poor crown development, a dramatic decline in growth rates, and susceptibility to stem decay and damage. Crews that did the stand level inventory denoted the

TABLE III-4 - OLD GROWTH PROPOSED FOR HARVESTING TREATMENT

UNIT #	SLI #	ACRES	GROSS MBF/ACRE	COVER TYPE	% OF PROJECT OLD GROWTH PROPOSED FOR HARVESTING
4	21	11	22	MC*	5
15	15	20	10	MC	8
6	10	77	23	MC	31
8	1	58	14	SAF*	24
10	3	21	15	MC	9
13	4	9	6	WL/DF*	4
13	5	12	14	MC	5
13	3	16	14	MC	6
13	4	6	17	MC	3
12	20	15	17	MC	6
Totals:		245			100
MC- mixed conifer SAF - subalpine fir WL/DF - western larch/Douglas-fir					

level of stand decadence with a range of 4 codes that indicated the level of tree vigor within a stand. A stand with a "full vigor" rating is not in a state of decadence and would have few old-growth characteristics. On the other end of the spectrum, a stand with a "poor vigor" rating would likely display many of the important attributes exhibited by a typical old-growth stand. Within the Good/Long/Boyle Timber Sale Project old-growth stands that are proposed for timber harvesting, 100% of the 245 old-growth acres have a "good to average" vigor rating where growth has not slowed greatly and crown lengths are still over 33% of stem height.

- **Stand Structure**

  The structure of forested stands indicates one characteristic often associated with old growth, namely whether or not the stand is in a multistoried condition. The multistoried condition arises when a stand has progressed through succession to the point that shade-tolerant species are replacing a shade-intolerant overstory. Within the 245 old-growth acres, 96% have a single-storied stand structure. This single-storied structure may be attributed to wildfires and timber harvesting activities from the past.

- **Stocking Levels**

  The stocking level (amount of gross volume per acre) is a good indicator of tree size and distribution. Higher volumes may indicate larger trees and/or more densely stocked stands. The effects of ingrowth and lack of wildfire are minimized by SLI volume estimates that do not include trees under 9 inches in diameter. One half of the old growth acres in the project area (51%) are comprised of stands with 10 to 15 MBF per acre. Another 4% of the acres have 4 to 9 MBF per acre, 9% have 16 to 20 MBF per acre, and 36% have 20 to 23 MBF per acre. Approximately one half of the volume in these stands are subalpine fir and lodgepole pine that are 8 to 14 inches in diameter.

- **Snags Per Acre**

  Large diameter snags, those valued more highly for wildlife habitat, are sparse and widely scattered throughout the Good/Long/Boyle Timber Sale Project area. One stand in the Lupfer area and 3 stands on the Martin Camp side of the project area have a relatively abundant number of high-value snags per acre. These stands were already deferred from harvesting with this timber sale project. Past fires and subsequent salvage logging have also reduced the number of snags that may have been found on these sites in the past. Portions of Unit 8 exhibit one of the highest levels of well-distributed snags per acre within the project area. There were approximately 8 to 12 snags per acre; however, the snags, composed of predominantly dead subalpine fir, lodgepole pine, and western white pine, are of small diameter (9 to 14 inches dbh). The level of pini and Indian paint fungus in this stand indicates that many of the larger western larch and subalpine fir are likely candidate snags.

- **Large Live Trees**

  The distribution and number of large live trees (over 21″ dbh) is relatively low throughout the project area (less than 1 to 5 per acre). Typically, these old-growth stands that are a simple product of plant succession would have a higher number of trees in the larger diameter classes; there are a number of probable causes for the lack of large trees on these sites, including past logging, marginal growth rates due to high stocking levels, and past fire activity. The majority of the stands qualifying as old growth average 5 to 8 trees per acre in the 17-to-20-inch dbh class. Various portions of the stands have clumps of the 17-to-20-inch dbh class at 9 to 20 trees per acre.

- **Coarse Down Woody Material**

  The majority of the old-growth stands within the Good/Long/Boyle Timber Sale Project area have some form of down woody material. Because of the historical frequency of natural fire and evidence of fire scars on standing trees in the area, it might be assumed that some down woody material and logs were consumed in past fires. The most abundant and well-preserved logs are found in draws and stream drainages where fires probably burned less intensively. Large-diameter western larch logs, a by-product of historic logging activities, are also scattered throughout the Good/Long/Boyle area. The butt log (portion of the base of the tree that tapers considerably) was often full of pitch or rot and difficult to run through the old sawmills; therefore, many were left behind and remain in the woods today.

OTHER RESOURCES CONSIDERED

ANALYSIS METHODS

The following resources are routinely analyzed by DNRC; however, they are not part of the vegetative analysis and, therefore, analysis methods are different. The analysis method is subjective as condition and effect of air quality and aesthetics are not easily measured. The amount and condition of roads are more easily quantified.

ANALYSIS AREA

Aesthetics and roads are only considered within the project area and as they relate to adjacent neighbors, wildlife, and water quality. The analysis area for air quality is described under that section.

AIR QUALITY

Federal, State, and local agencies enforce rules for controlled open burning. Air quality is analyzed by estimating emissions from prescribed broadcast burns and determining where project-related activities would create dust on roads. The air-quality analysis area includes all of Flathead County and is located in Montana Airshed 2 of the Montana Airshed Group. Temporary reductions in air quality currently exist from occurrences of wildfires, prescribed broadcast burning, and road dust. The southern portion of the project area is located in Impact Zone K (Kalispell area).

AESTHETICS

The gentle topography of the Good/Long/Boyle Timber Sale Project area does not lend itself to being a high-profile or high-visibility area. Where past harvesting occurred on adjacent acres or within the project area itself, those sites are often visible from existing roads or from hilltop vantage points throughout the project.

Most of the area is not visible from Highway 93 or Lower Stillwater Lake. From Whitefish Divide and Werner Peak Lookout, the Good/Long/Boyle Timber Sale Project area is too distant for the edges of past harvest units to be clearly visible. Existing buffers and residual trees in old harvest units have left a mosaic of diverse forest types and multiaged stands on the landscape.

ROADS AND TRANSPORTATION SYSTEMS

Refer to the Proposed Harvest Area Map in Chapter II or Road Map in Chapter IV for existing roads in the Good/Long/Boyle Timber Sale Project area.

Timber sales in recent decades have extensively improved the Martin Camp and Lupfer road systems. Both main road systems meet or exceed BMPs and safety requirements; therefore, maintenance needs are limited to routine ditch cleaning, road surface blading, and replacing a few ditch-relief culverts. BMPs consist of precautionary measures used during logging, road-building, road-improvement, or stream-crossing projects in order to minimize negative effects to the environment. Forestland managers recognize that roads are a continual source of sedimentation and require long-term maintenance. DNRC has addressed this problem by minimizing new road construction and adding drainage improvements to existing roads.

Several gated and closed spur roads intersect with the open road systems. Some closures need to be reinforced with improved gates or barriers in order to limit motorized use.

The West Fork bridge on Antice Knob Road needs to be replaced with a permanent bridge. A contract engineer consultant, hired in the summer of 1999, determined that the existing temporary bridge could not be permanently installed because it is not long enough for the crossing. The bridge is outside of the immediate project area; however, the need for replacement is a priority and road maintenance is primarily funded through timber harvesting. The West Fork bridge is located on the West Fork of Swift Creek in the SW¼, Section 34, T34N, R22W, approximately 1.4 miles southeast of Upper Whitefish Lake.

Requests have been received from private individuals for easements on existing roads across State land into Sections 20, 28, and 29, T32N, R23W, from the end of Martin Camp Road. Currently, the State has not granted any permanent rights-of-way to access these private holdings.

ECONOMICS

- **Current Conditions**

  Based on a past study, The Role of the Wood Products Industry in the Economy of Flathead County, Montana, An Estimate of the Effects on Total Employment Using Input-Out Analysis, 20% to 35% of the economy of Flathead County can be attributed to the wood products industry. This estimate of the economic effect of the wood products industry was determined, primarily with the use of the computer program **Micro Implan**, an economic impact model based on county-level economic data (Beckley, 1994).

- **Past Harvests from the Good/Long/Boyle Timber Sale Project Area**

  Table III-5 is a review of past harvesting activity in the Good/Long/Boyle Timber Sale Project area. The estimates of past harvesting activity are from the section record cards that are located in Missoula. The volume is only for products that were entered into the section record cards as board feet. MBF/Acre is past harvest volume (MBF) divided by acres.

  The following amounts were harvested, by decade, as follows:

1910-1920 - 9,367 MBF
1920-1930 - 30,749 MBF
1930-1940 - 59 MBF
1940-1950 - 5,400 MBF
1950-1960 - 1,789 MBF
1960-1970 - 133 MBF
1970-1980 - 2,595 MBF
1980-1990 - 13,684 MBF
1990-to present - 1,622 MBF

• Past Costs and Revenues From DNRC'S Forest Product Sale Program

DNRC does not have a formal accounting system to track costs for individual projects from start to finish. An annual cash-flow analysis is conducted of the DNRC forest-product-sales program. Revenue and costs are calculated by land office and at the Statewide level. The revenue-to-cost ratios are a measure of economical efficiency. A ratio value less than 1.0 means that the costs are higher than the revenues (losing money). A ratio greater than 1.0 means revenues are higher than the costs (making money). A ratio equaling 1.0 means that the costs equal the revenues. As displayed in Table III-6, the ratio for NWLO was 2.41 for 1995, 1.51 for 1996, 1.52 for 1997 1.58 for fiscal 1998, 1.23 for 1999, and an estimated 2.1 for 2000 (the figures for FY00 will not be available until August).

Total revenue is revenue from timber sales, permits, FI, and road maintenance, and total cost is the sum of timber operating and general administration costs.

• Other Sources of Revenue to the Trust

The Good/Long/Boyle Timber Sale Project area generates additional revenue for the State trust through leases and permits for recreational and commercial uses. The area receives year-round recreational use that includes berrypicking, hunting, fishing, snowmobiling, dog sledding, and camping. The commercial uses of the project area include American Timber's mill site, the Girl Scout Camp on Lower Stillwater Lake, and Dog Sled Adventures' optional late spring use of martin Camp roads and trails. Also, there is a private homesite and small sawmill on leased State land. The amount of the current

TABLE III-5 - PAST HARVESTS BY SCHOOL GRANT AND SECTION (years between 1915 and 2000)

TOWNSHIP	RANGE	SECTION	GRANT*	VOLUME (MBF)	ACRES	MBF PER ACRE
31N	24W	01	A.C.B.	3,742	640.2	5.8
32N	23W	17	S.N.S.	7,694	573.1	13.4
32N	23W	19	P.B.	3,481	591.3	5.9
32N	23W	20	A.C.I.	3,410	316.8	10.8
32N	23W	27	P.B.	1,500	640.0	2.3
32N	23W	28	A.C.I./A.C.B.	9,211	561.5	16.4
32N	23W	29	S.N.S.	5,210	520.0	10.0
32N	23W	30	S.M.	7,504	606.0	12.4
32N	23W	31	P.B.	5,961	610.7	9.8
32N	23W	32	A.C.I.	6,094	640.0	9.5
32N	23W	33	S.N.S.	11,774	590.0	20.0
TOTALS				65,581	6,289.5	10.4

A.C.B. - Agricultural College at Montana State University (Morrill Grant)
A.C.I. - Agricultural College at Montana State University
C.S. - Common School
P.B. - Public Buildings
S.M. - School of Mines
S.N.S. - State Normal School

TABLE III-6 - THE NET REVENUE/COST RATIOS (TIMBER SALE ACCOUNTING SUMMARY - FY95 AND REVISED FY94 MEMO, FY96, FY97, FY98)

	TOTAL REVENUE/TOTAL COST RATIO				
FISCAL YEAR:	**FY95**	**FY96**	**FY97**	**FY98**	**FY99**
NWLO	2.41	1.51	1.52	1.58	1.23
Total Program	2.07	1.68	1.89	1.72	1.36

TABLE III-7 - REVENUE GENERATED THROUGH LEASES/PERMITS IN THE PROJECT AREA

CURRENT PERMIT/LEASE	**TOTAL DOLLARS GENERATED PER FISCAL YEAR**
State Recreational Use License*	444.00
Dog Sled Adventures - extension lease for spring use ($3.00/person/use day)	**No figure available - new lease**
Incidental firewood permits @ $5.00/cord	200.00
Lease homesite/sawmill	872.70
Girl Scout Camp	1,890.00
American Timber Mill site (to close 7/00)	38,880.00
Approximate total	42,386.70

**State lands are available for public use to anyone purchasing a Recreational Use License. Licenses are not site specific and allow use of all legally accessible State lands. Therefore, it is difficult to determine the amount of recreational use and income for a specific area resulting from license sales. Statewide, the licensing year runs from March 1 through February 28. The total gross revenue to the trust for the 2000 license year was $290,447; there is, approximately, 5,157,840 acres of trust land statewide. Therefore, an average gross revenue of $.056 per acre, approximately, was generated during license year 2000. Applying the statewide average revenue per acre to the 7,920 acres of State land in the Good/Long/Boyle Project area produces an estimated revenue of $444 per year from Recreational Use Licenses.*

revenue generated through these uses is detailed in Table III-7. The future revenue from the above uses is uncertain due to the announced closure of American Timber Mill in July, 2000 and the likelihood of all State lease rates to increase over the next few years.

HYDROLOGY, FISHERIES, AND SOILS

Introduction to Analysis Area for Watershed, Fisheries, and Soils

The Good/Long/Boyle Timber Sale Project area is located within Stillwater State Forest, north of Whitefish, Montana. The project proposal includes timber harvesting in 11 sections of State land that involve portions of the Good Creek, Long Meadow, and Stillwater River watersheds. Elevation ranges from 3,000 feet, where Stillwater River leaves Section 33, to approximately 3,500 feet near the southern line of Section 1. Slopes within the project area are generally 5 to 25%, with a few terrace slopes up to 40%. Precipitation in the project area is 20 to 30 inches per year.

The project area is a depositional

landform consisting of ground moraines left by glaciers and old stream terraces. The rolling topography contains several meadow complexes in the lowlands. During spring runoff and early summer, the overland flow drains through swales and meadows. Most of the drainages are discontinuous and water is transported by subsurface flows. By midsummer surface water can only be found in some meadows.

Regulatory Framework

- ***Surface Water-Quality Standard***

  This portion of the Flathead River drainage, including Stillwater River above Logan Creek, is classified B-1 by the Montana Surface Water Quality Standards. Waters classified B-1 by the standards must be maintained suitable for:

  - drinking, culinary, and food processing purposes after conventional treatment;
  - bathing, swimming, and recreation;
  - growth and propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; and
  - agricultural and industrial water supplies (ARM 17.30.623).

  Among other criteria for B-1 waters, "no increases are allowed above naturally occurring concentrations of sediment…". Naturally occurring includes conditions or materials present from runoff on developed land where all reasonable land, soil, and BMPs have been applied. Reasonable practices include methods, measures, or practices that protect present and reasonably anticipated beneficial uses. These practices include, but are not limited to, structural and nonstructural controls and operation and maintenance procedures. Appropriate practices would be applied before, during, and after all proposed management activities.

- ***Water-Quality-Limited Waterbodies***

  Stream segments within the main project area are not listed in the Draft 2000 303(d) List produced by DEQ. This document lists the waterbodies that are in need of Total Maximum Daily Load (TMDL) development. The portion of Stillwater River that is downstream of the project area, however, is on the 303(d) list.

  The West Fork of Swift Creek is considered to be a disjunct project area for this proposal since the Good/Long/Boyle Timber Sale Project will fund the replacement of the West Fork bridge. The West Fork of Swift Creek is listed in the Draft 2000 303(d) list.

  Waterbodies listed as water-quality limited are prioritized by DEQ for development of a TMDL. Until a TMDL is developed for Stillwater River and the West Fork of Swift Creek, House Bill (HB) 546 (Montana TMDL Law) states that new or expanded activities that may further the listed impairment may commence and continue provided they are conducted using all reasonable land, soil, and water conservation practices, commonly referred to as BMPs.

- ***Beneficial Uses/Water Rights***

  Water rights within the project area are on file for:

  - domestic, industrial, and commercial uses;
  - irrigation and stock watering; and
  - fire protection.

  No domestic-use water rights are on file from named-source surface water within the project area. A complete list of water rights can be found in the project file.

- ***Cumulative-Effects Analysis Area For Watershed, Fisheries, and Soils***

The cumulative-effects analysis will take into account all past, present, and proposed activities that may affect the particular resource area (hydrology, fisheries, soils). The cumulative effects boundary will vary by resource due to the differing spatial influence of the topography.

The watershed/fisheries cumulative-effects analysis area for the Good/Long/Boyle Timber Sale Project area (*refer to Appendix C, watershed maps*) includes:

- Good Creek
- Long Meadow
- a portion of Stillwater River
- the West Fork of Swift Creek (bridge replacement)

Generally, due to the small size of the project area compared to the size of some of the watersheds involved, the entire watershed would not be analyzed for cumulative effects. However, since the USFS has proposed a project in the Good Creek drainage, including the entire watershed in the cumulative-effects analysis is logical.

The soils cumulative-effects boundary is the project area.

- **Methodology**

  - ***Water Yield***

Cumulative watershed impacts are defined as impacts to water quality that may result from the proposed action when combined with other past, present, and future planned actions. Individually, these actions may not adversely affect water quality, but, when combined, they present a higher risk of adverse impacts. Timber harvesting and associated activities can affect the timing, distribution, and amount of water yield in a harvested watershed. Water yields increase proportionately to the percentage of canopy removed because removing live trees reduces the amount of water transpired, which leaves more water available for soil saturation and runoff. Canopy removal also decreases interception of rain and snow and alters snowpack distribution and snowmelt, which lead to further water yield increases. Higher water yields may lead to increases in peak flows and peak-flow duration, which result in accelerated streambank erosion and sediment deposition.

The cumulative effects of past activities in the Good/Long/Boyle Timber Sale Project area, including the Good Creek watershed, were determined using the R1WATSED model developed by Region 1 of the USFS. WATSED estimates the increase in water yield caused by the removal of live trees using the Equivalent Clearcut Area (ECA) method. ECA is a function of the total area that is roaded and harvested, the percent of crown removed during harvesting, and the amount of vegetative recovery that has occurred in the harvested areas. This method equates area harvested and percent of crown removed with an equivalent amount of clearcut area. For example, if 100 acres had 60% crown removed, the ECA would be approximately 60, or equivalent to a 60-acre clearcut. The relationship between crown removal and ECA is not a 1-to-1 ratio, so the percent of ECA is not always the same as the percent of canopy removal. As live trees are removed, the water they would have evaporated and transpired either saturates the soil or is translated to runoff. This method also calculates the recovery of these increases as new trees vegetate the site and move toward preharvest water use.

In order to effectively evaluate the potential cumulative effects of past activities, a threshold of concern must be established for each of the watersheds. The stability of a stream channel is the best indicator of where a threshold of concern should be set. As water yields increase as a result of canopy removal, the amount of water flowing in a creek gradually increases. When the increases reach a certain level, the bed and banks may begin to erode. More stable streams will be able to handle larger increases in water yield before they begin to erode, while less stable streams will experience erosion at more moderate water yield increases. The channel stability of the streams in and around the project area were evaluated using qualitative assessments, as well as using procedures outlined in *Forest Hydrology Part II (1976)*.

- *Water Quality*

Timber harvesting and related activities, such as road construction, can lead to water-quality impacts by increasing the production and delivery of fine sediment to streams. Construction of roads, skid trails, and landings can generate and transfer substantial amounts of sediment through the removal of vegetation and exposure of bare soil. In addition, removal of vegetation near stream channels reduces the sediment-filtering capacity and may reduce channel stability and the amounts of large woody material. Large woody debris is a very important component of stream dynamics, creating natural sediment traps and energy dissipaters to reduce the velocity and erosiveness of streamflows.

The existing impacts to water quality in the project area were analyzed primarily through a sediment-source inventory. Stream channels were examined to determine any point sources of sediment. Examples of in-channel sources of sediment would include down-cutting of the channel bed, gully formation, and streambank erosion. In addition, a sediment-source inventory of the existing road system was conducted to determine both point and nonpoint sources of sediment.

• Existing Conditions

- *Hydrology*

A majority of the project area is drained into Stillwater River through a series of meadows and seasonal wetlands. A smaller portion of the project area is drained by first-order tributaries into Good Creek or directly into Good Creek. *Table III-8* shows project acres by watershed. The small unnamed tributary in Section 19 has no harvesting activities proposed within its watershed boundary and, therefore, will be analyzed no further.

Recently, Tally Lake Ranger District published a FEIS for the Good Creek Resource Management Project area. All watersheds within the Good Creek drainage are below thresholds for water yield according to R1-WATSED models used for the Good Creek FEIS. Channel-stability surveys conducted in the Good Creek drainage during 1997 by USFS rated most reaches as 'good'

TABLE III-8 - PROJECT ACRES BY WATERSHED

WATERSHED	WATERSHED SIZE (ACRES)	PROJECT AREA IN WATERSHED (ACRES)
Good Creek	56,542	1,606
Long Meadow	4,371	512
Unnamed (Section 19)	858	301
Stillwater River	110,000	4,010

and a small portion as 'fair'.

Good Creek is a Rosgen Type B channel with substrate mainly in the cobble size, with smaller proportions of gravel and small boulders. This type of channel has a low-to-moderate sensitivity to disturbance and excellent recovery potential *(Rosgen, 1996)*. The potential for streambank erosion for this type of channel is generally low to moderate, but depends on the amount of rock in the streambank. A high bank with little vegetation exists on Good Creek in Section 31 of the project area; occasional slumps occur in this area. As described in the Record of Decision, a Level II watershed analysis was conducted on the Good Creek watershed.

The Long Meadow watershed is a series of low-gradient meadows and wetlands that, generally, hold water in the spring and early summer. A channel is scoured to where it meets Highway 93; however, where the highway crosses the stream, the flow is dispersed and no surface water enters Lower Stillwater Lake. As described in the SFLMP Record of Decision, a Level II watershed analysis was conducted on the Long Meadow watershed.

Below Lower Stillwater Lake, Stillwater River varies from a low-gradient meandering channel to a slightly higher gradient riffle-type channel with boulders and woody debris creating pocket pools and backwater eddies. Stillwater River runs through Upper and Lower Stillwater lakes. These lakes store water and sediment and dampen peak flows. With reduced peak flows, the potential for sediment contribution from in-stream sources is reduced. Near Martin Camp Road, the riparian area is intact with grasses, shrubs, and forbs vegetating the banks and floodplain. The intact banks along this portion of the river indicate fair stability. This channel is comparable to a Rosgen Type C channel with the substrate predominantly in the gravel size class. The potential for streambank erosion for this type of channel is very high due to the amount of fine material present and the lack of rock in the streambank. The sediment supply is generally high for this type of channel, but recovery potential is good *(Rosgen, 1996)*. As described in the SFLMP Record of Decision, a Level I watershed analysis was conducted on the Stillwater River watershed. Due to the low potential for impacts and the size of the watershed compared to the project, no further analysis was deemed appropriate.

- ***Annual Water Yield Increase***

In accordance with the SFLMP Watershed Resource Management Standard 7, the threshold of concern for water-yield increase in each of these watersheds has been set at 14%. To comply with Resource Management Standard 7, allowable water-yield increases in Stillwater State Forest must be managed with a low degree of risk. The threshold of concern relates to the percent over natural annual water yield that is likely to trigger in-channel erosion. The threshold is determined by the physical and biological characteristics present in each stream. *Table III-9* shows the current water-yield increase for each watershed in the project area. The Stillwater River will be discussed qualitatively due to the size of the watershed.

TABLE III-9 - ANNUAL WATER YIELD INCREASES FOR GOOD/LONG/BOYLE WATERSHEDS

WATERSHED	Long Meadow	All Good Creek
CURRENT INCREASE IN WATER YIELD	11%	8%
THRESHOLD	14%	14%
APPROXIMATE ECA PER PERCENTAGE INCREASE	110 ECA	110 ECA

- ***Fisheries***

The Montana Natural Heritage Program has listed the bull trout and the westslope cutthroat trout as 'Species of Special Concern'. The Governor's Bull Trout Restoration Team has developed guidelines for the protection of bull trout; these guidelines are commonly referred to as the Bull Trout Immediate Actions. A summary of the Bull Trout Immediate Actions can be located in the SFLMP Record of Decision. A Westslope Cutthroat Trout Conservation Agreement has also been accepted by DNRC. This Memorandum of Understanding between Federal agencies, State agencies, tribal governments, and private entities is oriented towards protecting existing populations and ensuring the long-term existence of westslope cutthroat trout in their historic range.

The Long Meadow watershed contains no fish due to the hydrologic nature of the channel. No further analysis of fisheries will be completed for this watershed.

According to the Montana River Information System, the Good Creek watershed contains westslope cutthroat trout and eastern brook trout. Genetic testing was completed on a sample of westslope cutthroat trout from the upper portion of Good Creek in 1988 by DFWP. The analysis showed that all of the sampled fish were pure-strain westslope cutthroat trout. Lower portions of the Good Creek watershed may, potentially, contain pure-strain westslope cutthroat trout; however, contaminating species were planted in the drainage historically.

Since 1988, Tally Lake Ranger District has completed limited species distribution sampling of the Good Creek watershed to look for trends in brook trout and westslope cutthroat trout competition. General observations were that the species composition in the Good Creek drainage remained unchanged since the 1988 survey. More detailed information regarding this monitoring may be requested from Tally Lake Ranger District.

Stillwater River contains several species of fish, including, but not limited to, bull trout, westslope cutthroat trout, eastern brook trout, rainbow trout, northern pike, yellow perch, whitefish, and sculpins (data from Montana River Information System). Bull trout downstream of Lower Stillwater Lake primarily use the river as a migratory route from Flathead River/Flathead Lake to spawning areas.

The West Fork of Swift Creek

contains eastern brook trout, westslope cutthroat trout, bull trout, and slimy sculpins. Data collected by DFWP indicates that the westslope cutthroat trout are nearly pure (95% to 98.9%) based on electrophoresis (a method of looking at DNA); however, contaminating species have been historically planted in the watershed. Bull trout were determined to be genetically pure according to 1992 data available on the Montana River Information System internet site.

- ***Soils***

Generally, soils within the project area are a result of deposits from glaciers, glacial lakes, and streams. Riparian soils and soils associated with landtypes 10-3, 12, 14-2, and 14-3 are considered sensitive. Within these landtypes, the soils are easily compacted and displaced, resulting in lower soil productivity.

Other soils within the project area contain a well-drained glacial till subsoil under volcanic ash influence loess. These soils have a longer season of operation than do the riparian and sensitive soils. However, operation of heavy equipment during wet periods would result in compaction and displacement.

Past harvesting in the project area has resulted in numerous skid trails and landings. Although these trails have revegetated, evidence is that the compacted soil has resulted in less vigorous tree growth rates. *(A summary of the soil types found in the project area and a more detailed description of the landtypes can be found in the project file.)*

WILDLIFE

Introduction

In this section, the existing environment is discussed. This description occurs on 2 scales. The first scale relates to the project area and/or the unit(s) proposed for harvest. Full descriptions for the project area and proposed harvest units are presented in *Chapter II*. The second scale relates to the surrounding landscape. This scale varies according to the species being discussed. Under each grouping or species heading, the size and description of the analysis area for the cumulative effects will be defined. If habitat for a particular species does not exist in the project area, no further analysis will be done.

Methods

To assess the existing condition of the project area and the surrounding landscape, a variety of techniques were used. Information for the following discussion and effects analysis in Chapter IV were provided by:

- field visits,
- scientific literature,
- SLI data, aerial photography,
- Montana Natural Heritage Program data, and
- consultations with other professionals.

Specialized methodologies are discussed under the species in which they apply.

Coarse-Filter Assessment

DNRC recognizes that it is an impossible and unnecessary task to assess an existing environment or the effects of proposed actions on all wildlife species. The assumption is made that if landscape patterns and processes are maintained similar to those that species adapted to, the full complement of species will be maintained across the landscape (DNRC 1996). This "coarse filter" approach supports diverse wildlife populations by managing for a variety of forest structures and compositions that approximate historic conditions across a landscape. To compare present and historical conditions across the landscape, the analysis was conducted on the entire Stillwater State Forest using SLI. *(Refer to the vegetative section earlier in this chapter for the existing conditions)*.

Fine-Filter Assessment

On any particular piece of ground, individual species that are recognized to be of special concern are evaluated (fine-filter analysis); those species are addressed below and include:

- wildlife species Federally listed as *threatened* or *endangered*,
- species listed as *sensitive* by DNRC and/or USFS for FNF, and
- species managed as "big game" by DFWP.

DNRC would manage to maintain rare or unique habitats and make reasonable attempts to pursue cooperative planning with major adjacent landowners *(DNRC 1996)*.

Threatened and Endangered Species

Four species indigenous to northwestern Montana are classified as threatened or endangered under the Endangered Species Act of 1973. The bald eagle, Canada lynx, and grizzly bear are listed as threatened; the Northern Rocky Mountain wolf is listed as endangered.

- ***Bald Eagle***

  The bald eagle is classified as threatened and is protected under the Endangered Species Act. Strategies to protect the bald eagle are outlined in the Pacific States Bald Eagle Recovery Plan *(U.S. Fish and Wildlife Service [USFWS] 1986)* and the Montana Bald Eagle Management Plan *(Montana Bald Eagle Working Group 1994)*. Management direction involves identifying and protecting nesting, feeding, perching, roosting, and wintering/migration areas *(USFWS 1986, Montana Bald Eagle Working Group 1994)*. The project area includes the Lower Stillwater Bald Eagle Territory. In 1988, a site-specific territory plan was developed *(Zubik 1988)*. The suggested guidelines in this plan were followed in the development of this proposal.

  The bald eagle territory is split into 3 management areas: nest, primary use, and home range. The nest area includes the nest tree with a quarter-mile buffer, excluding the area to the west of Martin Camp Road. The nest stand consists of thick lodgepole pine (6 inches dbh) with a few scattered large western larch. A leaning western larch, which is expected to fall in the near future, supports the nest. Martin Camp Road passes within a one-quarter mile to the west of the nest, while 2 other roads come within one-eighth mile of the nest to the south and to the north. No harvest units are proposed in this management area; however, Units 14 and 15 occur near the boundary of the nest area.

The primary-use area contains more than 75% of bald eagle use for feeding and loafing. Within the primary use area, 3 key use sites and 6 perch sites were identified *(Zubik, 1989)*. No harvesting is planned within these areas. Approximately 15 acres of Unit 10, which mainly consists of dog-hair lodgepole pine with scattered medium-sized (15 inches dbh) western larch trees, occur in this management unit. A road that accesses the private land in Sections 28 and 29 cuts through Unit 10 near the section line. This road is used to access a boat ramp that has evolved over time on the west side of the lake. The west side of the lake is shallower and used extensively by eagles for foraging.

The home range includes all areas used by this pair of bald eagles and will be used to assess the cumulative effects of this project. Special features in this area include several potholes and a ground squirrel colony, where eagles search for prey. Units 10, 11, 13, 14, 15, and 16 are proposed in the home range area. Unit 11 and 14 are near potholes and are the only stands that may affect eagle habitat in the home-range area. Unit 14 is, primarily, lodgepole pine in the 40-to-99-year-old age class. Typically, lodgepole pine does not provide strong branches for eagles to perch; therefore, this stand is not important for eagle perching, but does provide cover for summering deer and visual screening. Unit 11 is presently in a mixed-conifer cover type, with scattered western larch/Douglas-fir in the overstory intermixed with lodgepole pine and Engelmann spruce. The larger trees in the overstory provide eagle perching sites for hunting/feeding in proximity to the pothole, while the understory trees provide visual screening. Management around these potholes would include retaining and/or promoting the development of perch trees. Also, at least 100-foot buffers along these riparian features are recommended to provide perches, visual screening, and summer white-tailed deer security cover.

- ***Canada Lynx***

Canada lynx are listed as "Threatened" under the Endangered Species List. Lynx are associated with boreal and montane forests above 3,700 feet in the Rocky Mountains. Approximately, 99% of all lynx documented in Montana occurred above the 3,700-foot elevation limit, with a majority of those observations occurring between 4,500 and 7,600 feet *(McKelvey 2000)*. Lynx habitat in western mountains consists primarily of coniferous forest with plentiful snowshoe hares, mature forest for denning and cover for kittens, and densely forested cover for travel and security. Lynx usually occur where topographic relief is low. Snowshoe hares use thick stands of regeneration and other stands that provide dense, low canopy cover. The project area falls outside the elevational range of the lynx.

An early-winter track survey in the Martin Camp area revealed a high number of snowshoe hare tracks. Generally, young lodgepole stands showed high numbers of hare tracks. These stands are not proposed for harvesting activities. Other units surveyed showed some use by hares. No lynx tracks were documented. Casual observation in the later part of the winter indicated reduced snowshoe hare use. The initial survey occurred following a long period of no snow accumulations, while the later casual observation followed recent snow accumulations. Therefore, the initial survey is biased toward larger track observations, while the later may be more indicative of hare use in the area. In either case, snowshoe hare use of the area does occur.

- ***Grizzly Bear***

Grizzly bears are listed as threatened under the Endangered Species Act. The Grizzly Bear Recovery Plan defines 6 recovery areas *(USFWS 1993)*. This project is proposed in grizzly bear habitat in the North Continental Divide Ecosystem (NCDE) recovery area. The NCDE is divided into subunits. Each subunit approximates the size of a female bear's home range and is separated from other subunits based on topography. Units 5 through 8 of this proposed project are in the Lazy Creek Subunit.

Grizzly bears use their home ranges differently according to seasons. The habitat quality during spring, summer, and autumn seasons were modeled by *Mace, et al*, (in press). Based on the seasonal maps, most of the habitat values in all seasons in the subunit fall in the low to low-middle range. Spring habitat is distributed throughout the subunit. Units 5 through 8 provide low to low-middle range habitat quality. Areas near Lake House Meadow in Unit 7 provide higher spring habitat values. Summer and autumn habitat is rated low in the project area.

Cumulative analysis was conducted using the Lazy Creek Subunit. This subunit is comprised of, approximately, 34,564 acres (54 square miles) of land belonging to:

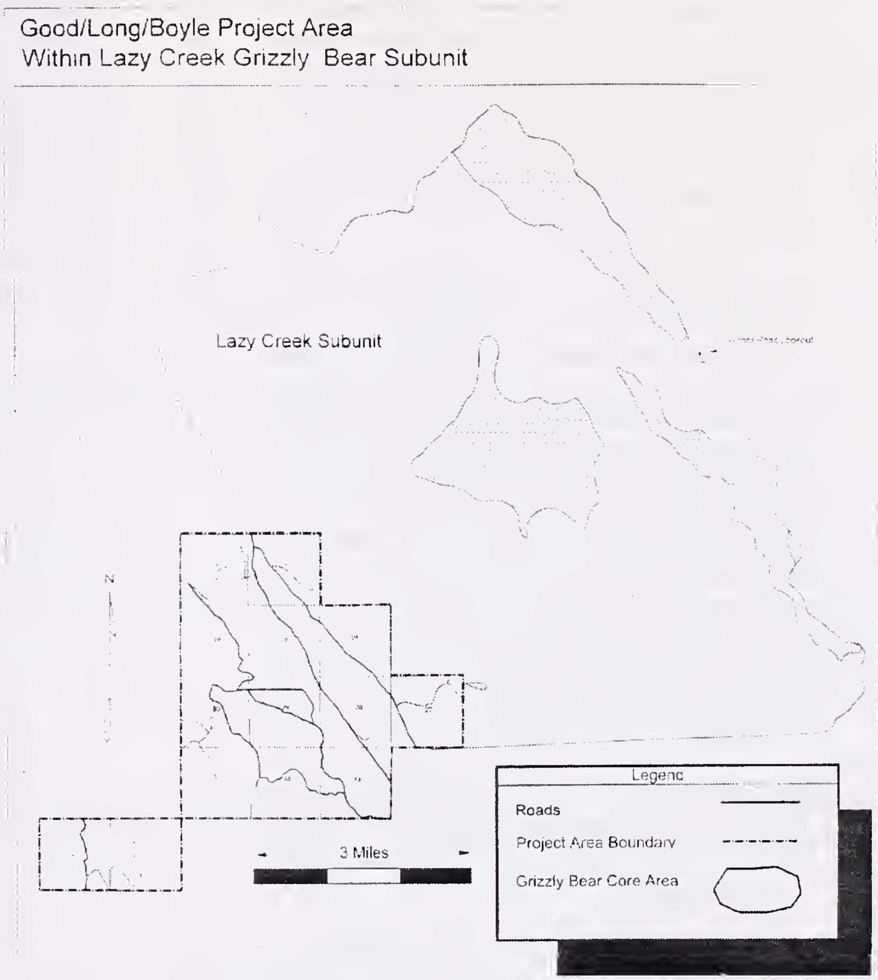
- Plum Creek Timber Company (15,013 acres)
- State of Montana (14,520 acres)
- USFS (4,008 acres)
- other private ownerships (1,020 acres)

Several projects are proposed in this subunit and are at varying stages of development. In the Chicken/Werner Timber Sale Project, a Record of Decision was issued with a selected alternative. The South Taylor Timber Sale Project has several alternatives roughed out. *(Refer to Stillwater State Forest Map, Appendix B, and List of Related Environmental Reviews, Appendix D.)* The cumulative effects of the Good/Long/Boyle Timber Sale Project, in combination with these projects, will be discussed in the effects analysis *(Chapter IV)*. Completed timber sales are included in this analysis in the existing conditions. The following discussion of existing conditions represents the current habitat conditions in the subunit. Even though the Chicken/Werner Timber Sale Project is near initiation, the effects were not considered in the existing condition, but will be considered in cumulative effects.

Hiding cover is believed to become limiting when it drops below 40% of the subunit. If enough vegetation occurs in a stand to hide 90% of a grizzly bear at 200 feet, the stand is considered to provide hiding cover. Hiding cover is important in areas with high human disturbance, especially along open roads and around feeding sites, such as meadows, old harvest units, etc.

Hiding cover in the Lazy Creek Subunit was reduced by past timber harvesting. Presently, approximately, 13,393 acres (92%) of State trust land and 6,005 to 9,008 acres (40% to 60%) of Plum Creek Timber Company land consist of hiding cover in this subunit. Hiding cover on other ownerships is unknown, but assumed present in all unharvested areas. Therefore, hiding cover in the subunit ranges between 56% and 79%.

FIGURE III-3 - GRIZZLY BEAR SECURITY CORE AREA IN THE LAZY CREEK SUBUNIT



Access management is a major factor in managing grizzly bear habitat. The Interagency Grizzly Bear Committee assigned a task force to define parameters to be used in managing access in the NCDE. Based on the findings of this task force, DNRC, in an internal guidance, adopted a *no net increase* in the amount of area that exceeded 1 mile per square mile and 2 miles per square mile in open (POR) or total roads (PTR), respectively. Additionally, DNCR committed to a "no net decrease in amount of security core areas." The maximum values (baseline) of POR and PTR were set by conducting the moving-windows analysis on a road layer dated February 1996. This is the oldest, complete road-data layer on file at DNRC. To measure these parameter, the EPPL7 computer software *(Minnesota LMIC 1991)* was used to follow the protocol described in *Ake (1994)*. The POR of the subunit is 46%, while the percentage of State lands exceeding this value is 69%. The PTR of the subunit is 71%, while the percentage of the State lands exceeding this value is 73%. The security core area is limited to 14% of the bear management unit (BMU) in 3 blocks ranging from 910 to 2,184 acres (Figure III-1). The 1995 baseline values for State trust lands are 76%, 76%, and 13% for POR, PTR, and security core, respectively.

- ***Northern Rocky Mountain Wolf***

The Northern Rocky Mountain Wolf is listed as *endangered* under the Endangered Species Act. The *Northern Rocky Mountain Wolf Recovery Plan* defines 3 recovery zones *(USFWS 1987)*. The proposed project is in the Northwest Montana Recovery Zone.

The wolf is a wide-ranging species. Adequate habitat for wolves contains adequate vulnerable prey and minimal human disturbance. Primary prey species in northwest Montana are white-tailed deer, elk, moose, and mule deer. Distribution of wolves in Montana is strongly associated with white-tailed deer winter range. Typically, wolves in northwest Montana den in late

April. Wolves choose elevated areas in gentle terrain near a water source (valley bottoms), close to meadows or other openings, and near big game wintering areas for dens and rendezvous sites. Wolves are most vulnerable to human disturbance at den and rendezvous sites.

Wolf use of the project area is unknown. Since no large big game winter concentrations occur near the project area, wolf dens and rendezvous sites are not expected to occur. However, the east portion of the project area (east of Highway 93) is included in the Whitefish pack's home range *(USFWS 1999)*. The terrain in the project area appears suitable for denning and rendezvous sites. However, high human disturbance, high road densities, and the lack of major populations of wintering big game in this area reduce the habitat suitability for wolf denning and/or rendezvous sites.

Past harvest units on State and Plum Creek Timber Company lands altered habitat for big game, thereby changing prey availability in the area. *(For more discussion on big game effects, refer to the Big Game sections in this chapter and Chapter IV.)*

Sensitive Species

When conducting forest-management activities, the SFLMP directs DNRC to give special consideration to the several *sensitive* species. These species are sensitive to human activities, have special habitat requirements that may be altered by timber management, or may become listed under the Federal Endangered

TABLE III-10 - LISTED SENSITIVE SPECIES FOR THE NORTHWESTERN LAND OFFICE SHOWING THE STATUS OF THESE SPECIES IN RELATION TO THIS PROJECT

SPECIES	DETERMINATION - BASIS
Black-backed woodpecker	Dismissed - No recently (less than 5 years) burned areas are in the project area
Boreal owl	Dismissed - No units above 5,200 feet are proposed
Coeur d'Alene Salamander	Dismissed - No moist talus or streamside talus habitat occurs in the project area
Columbian sharp-tailed grouse	Dismissed - No suitable grassland communities occur in the project area
Common loon	Dismissed - No units are proposed within 500 feet of Lower Stillwater Lake
Ferruginous hawk	Dismissed - No suitable grassland communities occur in the project area
Fisher	Included - Potential fisher habitat occurs along Good Creek and Stillwater River
Flammulated owl	Dismissed - No dry ponderosa pine habitats occur in the project area
Harlequin duck	Included - Potential habitat occurs along Stillwater River and Good Creek
Mountain plover	Dismissed - No suitable grassland communities occur in the project area
Northern bog lemming	Dismissed - No sphagnum or other fen/moss mats occur in the area
Pileated woodpecker	Included - Western larch/Douglas-fir and mixed-conifer habitats occur in the area
Townsend's big-eared bat	Dismissed - No caves or mine tunnels occur in the project area

Species Act if management activities result in continued adverse impacts. Because sensitive species usually have specific habitat requirements, consideration of their needs serves as a useful "fine filter" for ensuring that the primary goal of maintaining healthy and diverse forests is met.

A search of the Montana Natural Heritage Database documented 2 sensitive species sightings in the project area or within 1 mile. The bald eagle nest and loon observations were documented through this search. The following sensitive species in *Table III-10* were either dropped from the analysis or carried forward for a detailed analysis in Chapters III and IV.

- ***Fisher***

  Fishers are listed by DNRC as a sensitive species due to their use of old-growth habitats *(DNRC 1996)*. Fishers are generalist predators and use a variety of habitat types, but are disproportionately found in stands with dense canopy. Fishers appear to be highly selective of resting and denning sites. In the Rocky Mountains, fishers appear to prefer late-successional coniferous forests for resting sites and use riparian areas disproportionately to the availability. Fishers tend to use areas within 155 feet of water. Such areas contain large live trees, snags, and logs, which are used for resting and denning sites, and dense canopy cover, which is important for snow intercept *(Jones 1991)*. Additionally, *Heinemeyer (1993)* found that reintroduced fishers in northwest Montana selected elevations between 1,970 and 3,280 feet and avoided elevations between 3,960 and 5,280 feet. DNRC's internal guidance aims at protecting valuable resting habitat near riparian areas and maintaining travel corridors. The project area ranges in elevation from 3,000 feet to 3,500 feet with Good Creek and Lower Stillwater River running through the project area. This area falls in the elevational range found by *Heinemeyer (1993)*.

Units 10 and 12 may provide habitat for fishers. Unit 10 lies near Stillwater River and mainly consists of lodgepole pine, which is not a preferred fisher cover type. Therefore, Unit 10 is not considered to provide fisher habitat. Unit 12, which lies along Good Creek is an old-growth mixed-conifer stand. This stand is located on a steep decline to Good Creek and possesses 2 characteristic stand types. On the western two-thirds of the stand, there are scattered large western larch with a thick understory of lodgepole pine. On the eastern third of the stand, the slope down to the creek is dominated by medium-sized western larch and Douglas-fir. The area probably does not provide high-quality fisher habitat, but may provide travel corridors.

Trapping is a significant source of fisher mortality. Trapping pressure was responsible for the extirpation of fisher over most of their range by the 1930s. Although they again inhabit this area, populations remain vulnerable to trapping because fishers are easily caught in traps set for martens, bobcats, and coyotes. Vulnerability to trapping is highly influenced by road density, both closed (snowmobiles) and open. Access to Good Creek is poor, however, access is much easier in the winter.

For cumulative analysis, the Good Creek drainage was considered because the only fisher habitat that may be altered with this project is along this stream. The riparian area and nearby stands along Good Creek are intact; however, many areas just outside of riparian and associated stands received regeneration harvests in the recent past. Fisher resting and denning habitat along the creek course is retained, though older stands away from the riparian area are fragmented by regeneration harvests. This situation provides a variety of habitat types, but limits the amount of interior old-growth habitat.

- ***Harlequin Duck***

Harlequin ducks winter in coastal areas and breed in fast-moving mountain streams. Nesting begins in late May. Harlequins breed on low-gradient mountain streams greater than 10 meters wide (approximately 33 feet) with dense riparian vegetation and good water quality. Stillwater River and Good Creek may provide breeding habitat for these ducks.

Sedimentation reduces water quality. Decreased water quality reduces harlequin duck prey availability and overall habitat quality. Roads are a major source of sedimentation to streams. The current road system may be providing sediment to Good Creek and Stillwater River. However, due to the intact stream courses, drainage patterns, and filtration of wetlands, sediment transport to the streams is limited.

- ***Pileated Woodpecker***

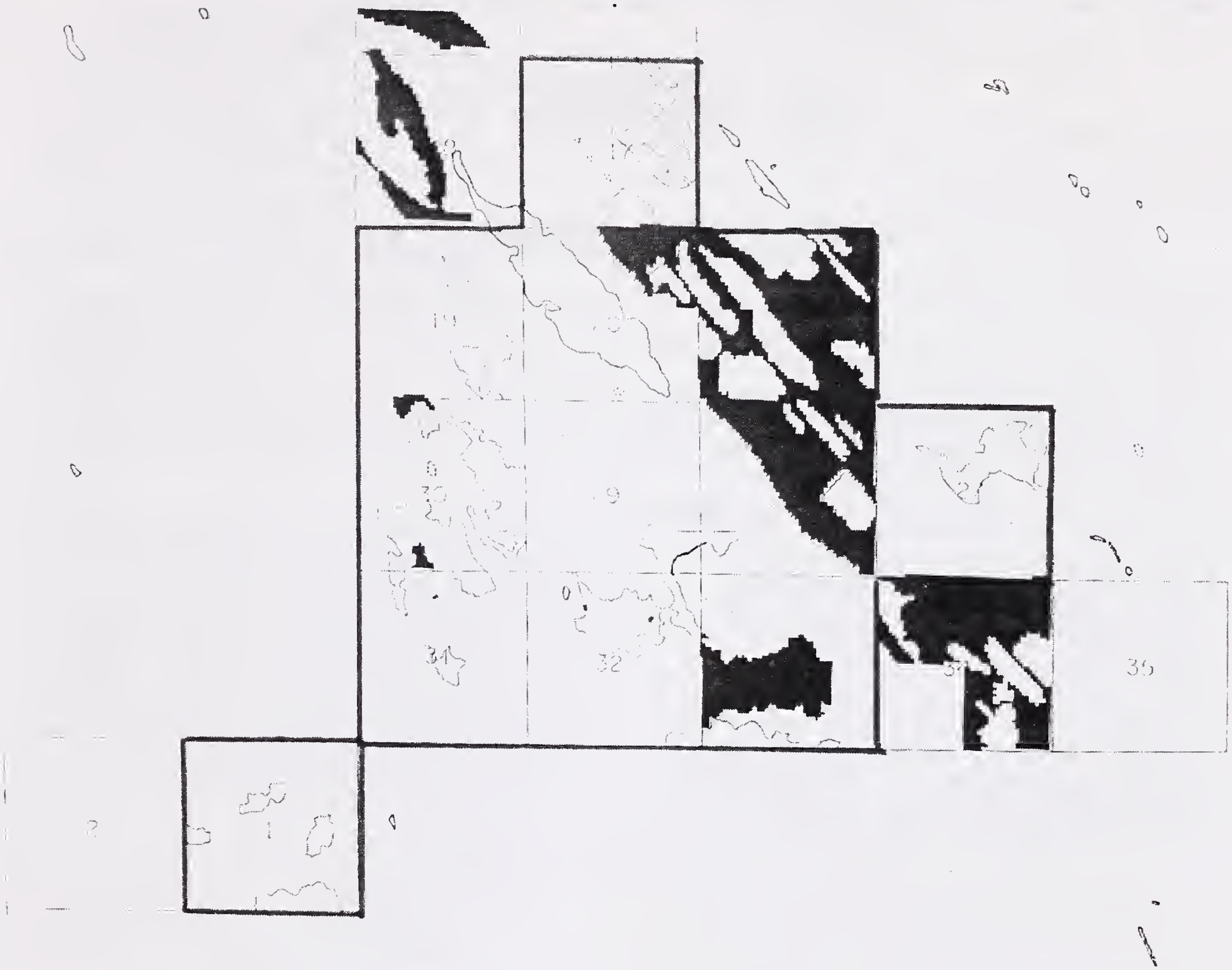
The pileated woodpecker plays an important ecological role by excavating cavities that are used in subsequent years by many other species of birds and mammals. Due to this important ecological niche, DNRC named the pileated woodpecker to their sensitive species list.

Pileated woodpeckers excavate the largest cavities of any woodpecker. Preferred nest trees are western larch, ponderosa pine, cottonwood, and aspen, usually 20 inches dbh and larger. Pileated woodpeckers primarily eat carpenter ants, which inhabit large downed logs, stumps, and snags. Nesting habitat for pileated woodpeckers was described by *Aney and McClelland (1985)* as "stands of 50 to 100 contiguous acres, generally below 5,000 feet in elevation with basal areas of 100 to 125 square feet per acre and a relatively closed canopy." The feeding and nesting habitat requirements, including large snags or decayed trees for nesting and large downed wood for feeding, closely tie these woodpeckers to mature forests with old-growth characteristics. The density of pileated woodpeckers is positively correlated with the amount of dead and/or dying wood in a stand.

Potential pileated woodpecker nesting habitat was identified by searching the SLI database for Old Stands with more than 100 square feet per acre. Based on these parameters, approximately 1,564 acres of potential habitat for pileated woodpeckers exist in the project area *(Figure III-4)*. Most of these acres are located in the area east of Highway 93. Younger-aged stands may provide feeding or lower quality nesting habitat. In the stands proposed for harvesting, only Units 6 (77 acres) and 7 (236 acres) rate as nesting habitat. On the west side of Highway 93, 3 sightings of pileated woodpeckers occurred during field work. These sightings all occurred around meadows with hardwoods along the edges.

Since the project area is large, the analysis conducted for the project area encompassed enough area to support several pairs of pileated woodpeckers. Therefore, the cumulative effects analysis area is the project area.

FIGURE III-4 - PILEATED WOODPECKER NESTING HABITAT IN THE PROJECT AREA BASED ON SLI DATA



Big Game

The project area is comprised of 2 areas of use. The first area is the Martin Camp area located west of Highway 93; the second is the Lupfer area that is located east of Highway 93. The Martin Camp area is along a major white-tailed deer migration route and provides summer range for white-tailed deer. The Lupfer area supports elk and white-tailed deer during the nonwinter period. Moose winter range is designated for the entire project area. Both portions of the project area receive a fair amount of hunting pressure during the big game general season. The big game analysis for this project will focus on white-tailed deer, elk, and moose.

Thermal and hiding cover provide 2 important parameters used to describe and manage big game habitat. Presently, the project area consists of 1,928 acres of winter thermal cover (does not include western larch), 3,051 acres of summer thermal cover (includes western larch), and 5,785 acres of hiding cover. The acres are broken down by the Martin Camp and Lupfer portions of the project area in *Table III-11*. The units harvested in the late 1980s and early 1990s have regenerated to provide hiding cover in the area. Hiding cover is especially important along open roads and riparian corridors and around feeding areas such as meadows and old harvest units.

TABLE III-11 -WINTER THERMAL, SUMMER THERMAL, AND HIDING COVER ACRES BROKEN DOWN BY THE MARTIN CAMP AND LUPFER PORTIONS OF THE PROJECT AREA

AREA	WINTER THERMAL	SUMMER THERMAL	HIDING COVER
Lupfer portion	1,116	1,514	1,896
Martin Camp portion	812	1,537	3,889
Total project area	1,928	3,051	5,785

The Martin Camp area is along a major white-tailed deer migratory route and provides summer habitat. Most of the project area is outside of the migratory corridor, but provides summer range for white-tailed deer. White-tailed deer migrate along riparian areas. The Good Creek riparian area provides the major migratory route from summer range to the Kuhn's area winter range. White-tailed deer summer habitat is comprised of heavily forested areas adjacent to riparian areas. Units 1, 2, 3, 4, 12, and 13 lie within the migratory corridor used by white-tailed deer (*Sime, pers. comm.)*. The remaining units fall within their summer range.

The Lupfer area provides habitat for elk and deer during the nonwinter period. The area is interspersed with meadows and contains several open roads. Elk avoid areas within one-half mile of open roads. Most of the area is within one-half mile of an open road, thereby increasing elk vulnerability and decreasing habitat. On Plum Creek Timber Company lands, most of the area is outside one-half mile of an open road; however, harvests have removed a majority of the cover. Units 5 through 8 may affect elk habitat.

Moose use the entire project area during the winter. During times of high snow accumulations, moose select mature timber stands with more than 50% canopy closure and substantial amounts of edge. The past harvesting activities produced many areas meeting the above description, thereby enhancing winter habitat for moose.

GOOD/LONG/BOYLE TIMBER SALE PROJECT

CHAPTER IV

ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

Chapter IV describes the environmental effects of each alternative on the resources described in Chapter III and provides the basis for the Summary of Environmental Effects Table at the end of Chapter II. Cumulative effects from current management and foreseeable future State actions are discussed in this chapter. These include other active timber sale projects, projects that are in the planning stage, ongoing maintenance, and other uses of the analysis area (Stillwater State Forest). Direct, indirect, and cumulative effects on the resources being analyzed were considered. An economic analysis is also presented. Appendix A lists proposed mitigation measures specific to Action Alternative.

CONCURRENT PROJECTS UNDER CONSIDERATION

The effects of past activities are discussed in Chapter III. Concurrent projects within the analysis area will be included as part of the effects analysis for Chapter IV. Recent, ongoing, and future activities identified as having potential effects on the Good/Long/Boyle Timber Sale Project analysis were discussed in Chapter I and listed in Appendix D. Additional projects on adjacent ownership, including Plum Creek Timber Company activities and USFS's Good Creek Resource Management Project, were considered during the effects analysis in this chapter.

VEGETATION

LANDSCAPE AND PROJECT LEVEL ANALYSIS

Methods

The same methods described in Chapter III will be used for the effects analysis in Chapter IV.

Analysis Area

The analysis area for direct and indirect effects is primarily at the project level and implies effects of the implementation of Alternative A or B to the immediate area. Cumulative effects on vegetation include effects of known past and current activities on all ownerships, as well as future State actions, within the analysis area in combination with activities proposed for this project. Cumulative effects are analyzed on the landscape level in order to address the effects of actions taking place forestwide or on adjacent forestland.

Insects and Diseases

Direct and Indirect Effects

- ***No-Action Alternative A***

  The insect infestations and disease infections would continue at the same rate, which is not out of proportion to the historic level.

- ***Action Alternative B***

  It is likely that through forest management activities and the process of thinning, which increases stand vigor, many species are likely to have more resistance to beetle infestations. By removing trees with dwarf mistletoe, adjacent regeneration and growing stock are less likely to become infected. Through the removal of western white pine infected with blister rust and the planting of blister-rust-resistant stock, the amount of healthy western white pine will likely increase over time.

Cumulative Effects

- ***No-Action Alternative A***

  The current trend in mortality, infestation, and infection levels in mature timber stands would continue. Some increases in insect infestation and disease occurrence can be expected as timber stands become more densely stocked, lower in vigor, and contain increased levels of blown down timber. From a large scale, this alternative would just slightly contribute over the next few decades to higher mortality and loss of value in timber stands from insects and diseases. Over the landscape level, the future trends in insect and disease occurrence will depend on management activities and natural disturbances that occur in mature timber stands. From the project level scale, if the current timber stand condition trends caused bark beetle outbreaks, substantial mortality over much of the project area may occur and loss of value due to stem decay will likely increase.

- ***Action Alternative B***

  The timber stands that would be entered would contain fewer trees infested with bark beetle and/or infected with stem rots because many of these trees would be harvested. The condition in the timber stands after harvesting would be less conducive to mortality and loss of value from insect and disease attack given that the proposed action would reduce stocking density, increase vigor, and remove concentrations of blowdown. Over the entire analysis area, this would cause a slight decrease in insect and disease occurrence. Other projects that propose timber harvesting in the analysis area have similar objectives and would likely have similar effects on insect and disease occurrences.

Wildfire Hazards and Risks

Direct and Indirect Effects

- ***No-Action Alternative A***

  The wildfire hazard would not change substantially in the short term. Eventually, due to the accumulation of fine fuels, snags, ladder fuels, and dead wood components, the hazard of a stand-replacement fire would increase.

- ***Action Alternative B***

  Immediately following timber harvesting, there would be an increase in the amount of fine flashy fuels. DNRC's hazard-reduction program requires that measures be taken to reduce the hazards of wildfires. These mitigations are included in our current State Hazard Reduction Guidelines; those specific to this sale are located in *Appendix A, Stipulations and Specifications*.

  All of the prescribed harvest methods would reduce ladder fuels through the harvest of Engelmann spruce, subalpine fir, and grand fir, which are a higher crown fire hazard because of their low-growing branches and combustible nature.

Fire-resistant trees, such as thick-barked western larch and Douglas-fir, left in the stands would be more likely to survive as a result of low-intensity burns and ground fires. Harvesting in stands that are heavily composed of older lodgepole pine will also reduce the overall fire risk and expected intensity of the type of burn that entirely consumes mature lodgepole pine stands.

Cumulative Effects

Common to Alternatives A and B

Whether or not Action Alternative B is selected for this project, the risk of wildfire would continue to increase as a result of long-term fire suppression. Forest land adjacent to the project area consists of areas with wide ranges of fuel loading. Much of the adjacent Plum Creek Timber Company ownership has been thinned in recent years and the resulting stands have a low wildfire risk due to light fuel loading. Portions of USFS lands are stocked in young even-aged stands with a minor amount of fire fuels, while other USFS acres are overstocked with suppressed trees and extreme fire fuel levels. The implementation of the USFS Good Creek Resource Management Project could conceivably reduce the risk of wildfire to neighboring acres, including the Good/Long/Boyle Timber Sale Project area.

Sensitive Plants

Direct and Indirect Effects

- ***No-Action Alternative A***

  No direct or indirect effects to sensitive plants would result under this alternative.

- ***Action Alternative B***

  No harvesting or burning is planned in riparian habitat where identified sensitive plants are known to occur. Burning, timber harvesting, and use of logging equipment are also restricted from SMZs, wetland buffers, and bogs. Alternative B proposes harvesting in 2 units that are directly adjacent to the 2 wetlands mentioned in Chapter III:

  - Unit 7 is a commercial thinning project to the west of Lake House Meadow, and
  - Unit 13 is a commercial thin/ shelterwood/seedtree located near the westerly edge of the tributary wetland of Good Creek.

  No sensitive plant populations were noted in or near Unit 7. *Viola renifolia* and the spruce/ skunk cabbage forest type were found in the Good Creek tributary wetland. *Viola renifolia* is usually found in swampy, boggy habitats; therefore, no direct effect is expected as a result of implementing Action Alternative B. SMZ buffers and equipment restriction zones would protect wet sites from heavy equipment and logging impacts. Furthermore, this species is under review and in the process of being dropped from the Natural Heritage Program's list because of the numerous locations where it occurs. If this species or other sensitive plant species are discovered during the implementation of the Good/Long/ Boyle Timber Sale Project, modification and mitigation measures would be applied on a per-site basis to ensure their protection.

  If any treatment to control noxious weeds are proposed in the future, the herbicide would not be applied in or near the riparian zones where sensitive species are likely to occur.

Cumulative Effects

- ***Common to Alternatives A and B***

  Past management activities and wildfires are likely to have somewhat altered the natural condition of sensitive species in the area. Current and future salvage sales and thinning projects would likely continue to take place in the analysis area. In most cases, a sensitive plant survey is done prior to a proposed action, and mitigation measures are carried out to ensure protection of sensitive species that are discovered. This helps minimize the effect of timber harvesting on local sensitive plant populations.

  The FEIS is out on the USFS (Tally Lakes Ranger District) Good Creek Resource Management Project. A sensitive-plant survey was conducted in this area and 10 sensitive plants and species of concern were found, mostly in wetlands, fens, and cedar type forests. More information is available in the Good Creek Resource Management Project FEIS.

  Plum Creek Timber Company has not conducted a formal sensitive-plant survey on their ownership. Riparian habitats are buffered during timber harvesting (State SMZ laws apply). Because most sensitive plants are found in these riparian sites, it is likely that sensitive species on Plum Creek Timber Company ownership would have some protection through the SMZ buffers.

- ***No-Action Alternative A***

  All existing vegetation would continue to be affected by natural processes (flooding, wildfires, channel migration, etc.).

- ***Action Alternative B***

  An increase in use by some wildlife species would likely occur where the forest canopy is opened up and forage is increased. Depending upon the palatability of sensitive plants in the area, wildlife populations may have some impact on this species. No active grazing leases occur in the project area; therefore, increased livestock use would not affect sensitive plant populations.

  There is an increased potential for noxious weeds to spread or be introduced during the proposed road reconstruction and harvesting activities. Noxious weeds will compete with many native species for space, light, nutrients, and water. Measures would be taken to prevent the introduction or spread of noxious weeds into the project area *(refer to NOXIOUS WEEDS)*.

Noxious Weeds

Direct and Indirect Effects

- ***Common to Alternatives A and B***

  Weed seed is currently being dispersed in the area, primarily by motorized vehicles. Other possible sources of weed introductions are from wind, hiking, fishing, hunting, bicycling, and horseback-riding activities. These activities would continue with the No-Action Alternative and are likely to increase with the continued population growth in Flathead Valley. In accordance with the Flathead County Weed Management Plan, an ongoing program of weed monitoring and spot spraying will occur in the area.

- ***No-Action Alternative A***

  Since Alternative A would not expose a great deal of mineral soil in the area, except where routine road maintenance or motorized recreation takes place, a slow steady increase of weed populations are likely to continue.

- ***Action Alternative B***

  Action Alternative B would expose mineral soil and increase the likelihood of noxious weeds becoming established during road repairs and logging. This alternative includes proposals to grade and improve existing road features; logging activities such as log yarding would require skid trails and landings. All of these activities would expose some mineral soil, leaving an area where weed seed is easily established.

  The Alternative B road package would improve existing road standards; thus, recreational use in the area would probably increase. More effective road closures and proposals to close additional road segments would help minimize the effects of motorized use and, subsequently, the spread of noxious weeds.

  The proposed timber harvesting would include additional sources of weed-seed introduction with the operation of heavy equipment and log-truck traffic in the area.

Noxious Weed Mitigation Measures

Mitigation measures for Action Alternative B would include contract clauses that require the following:

- Heavy equipment used for timber harvesting and road construction must be washed thoroughly to eliminate weed seeds before it is brought onto State lands.

- Following road construction and improvement activities, disturbed areas will be seeded with a grass seed mix that contains some native seed. Grass seeding is required to be done concurrently with construction activities in an attempt to control erosion and establish grass before weed seeds are introduced.

- Outside of the Martin Camp and Lupfer mainroad systems, the majority of connecting spurs are gated or bermed to prevent unmonitored motorized use. These closures would decrease the total amount of disturbed ground susceptible to the spread of noxious weeds from motorized traffic.

Cumulative Effects

- ***No-Action Alternative A***

  Past, present, and future activities on State forest lands contribute cumulatively to the spread of noxious weeds. State land-management activities, including general public recreation and activities occurring on adjacent ownerships, are likely to continue and would increase the spread of noxious weeds.

  With the adoption of the SFLMP, a more aggressive program for inventorying and treating noxious weeds on Stillwater State Forest has begun and would likely continue. This ongoing treatment for noxious weeds should help mitigate the increased use of the area and may actually reduce the population of weeds over the long term.

- ***Alternative B***

  As with No-Action Alternative A, land-management activities on adjacent ownership would also likely contribute to the slow spread of noxious weeds on State forestland.

  While these ongoing activities would increase, as would the risk of noxious weed populations in the area, a combination of mitigations that includes ongoing weed monitoring and spot spraying of herbicides may actually reduce the overall population of weeds over time.

Age-Class and Cover -Type Distribution

Direct and Indirect Effects

- ***No-Action Alternative A***

  If Alternative A were chosen and no management activities occur for this project entry, the following natural processes would likely take place:

  - The age-class distribution in the project area would remain the same for the short term.
  - Over time, lacking substantial disturbances, such as timber harvesting or wildfire, the proportion of seedling/sapling-sized stands would gradually decrease.
  - In the short term, stocking levels would generally increase.
  - In the short term, insect and disease levels would remain the same or increase due to the condition of the stands in the project area. Insect infestations and disease infections would likely spread to healthy trees as host trees die out.
  - As shade-tolerant species continue to grow under existing canopies, the mixed-conifer cover type will increase and the western larch/Douglas-fir cover type will decrease.

- ***Action Alternative B***

  Chapter II described the development of Alternative B, which proposes harvesting approximately 5 MMBF of sawtimber from 1,207 acres. The proposed harvest and reforestation methods differ between units; therefore, the effect on acres of age classes and cover types varies from unit to unit. *Table IV-1* shows the number of acres that would change to a different cover type and/or age class under the proposed harvest prescriptions in Alternative B. An overall summary of this information follows in *Tables IV-2 and IV-3.*

TABLE IV-1 - EFFECTS TO AGE-CLASS DISTRIBUTION AND COVER TYPE BY UNIT (Shows the projected changes in age class and cover types in harvest units following the proposed silvicultural treatments.)

UNIT #	TOTAL ACRES	CHANGES IN AGE CLASS	CHANGES IN COVER TYPE
1	41	Commercial thin treatment; no change in age class.	All 41 acres of the subalpine cover type are expected to move towards a western larch/Douglas-fir cover type.
2	10	8 acres would change from a 40-to-99-year age class towards a 0-to-39-year age class.	All 10 acres of lodgepole pine cover type would become a western larch/ Douglas-fir cover type after harvesting and planting.
3	15	15 acres would change from a 40-to-99-year age class towards a 0-to-39-year age class.	All 15 acres of the lodgepole pine cover type would become a western larch/Douglas-fir cover type after harvesting and planting.
4	15	No change	11 acres would shift from a predominantly mixed-conifer cover type towards a western larch/Douglas-fir cover type.
5	139	No change	No change

UNIT #	TOTAL ACRES	CHANGES IN AGE CLASS	CHANGES IN COVER TYPE
6	118	24 acres of old-growth mixed conifer would be regenerated to a 0-to-39-year age class.	76.5 acres of mixed conifer would move towards a western larch/Douglas-fir cover type through the removal of lodgepole pine and other whitewoods.
7	236	Commercial thin; no change in age class.	No change
8	104	30 acres of 100-to-old age class would be regenerated to a 0-to-39-year age class.	57.8 acres of subalpine fir cover type would move towards a western larch/Douglas-fir cover type with thinning.
9	53	30 acres of 100-to-old age class and 8.2 acres of 40-to-99-year age class would be regenerated to a 0-to-39-year age class.	8.2 acres of lodgepole pine would move towards a western larch/Douglas-fir cover type through harvesting and planting.
10	59	10 acres old growth and 24 acres of 40-to-99-year age class would be regenerated to a 0-to-39-year age class.	30 acres of mixed conifer and 29 acres of lodgepole pine cover type would move towards a western larch/Douglas-fir cover type after thinning.
11	107	No change	107 acres of a mixed-conifer cover type would move towards a western larch/Douglas-fir cover type through thinning.
12	16	12 acres of old-growth mixed-conifer would be regenerated to a 0-to-39-year old stand.	16 acres of a mixed-conifer cover type would shift towards a western larch/Douglas-fir cover type after harvesting.
13	123	No change	54 acres of a mixed conifer cover type and 45 acres of a lodgepole pine cover type would move towards a western larch/Douglas-fir cover type after harvesting the subalpine fir and lodgepole pine.
14	106	No change	15.3 acres of a mixed conifer cover type and 91 acres of a lodgepole pine cover type would move towards a predominantly western larch/Douglas-fir cover type.
15	41	9 acres of old growth and 6 acres of 100-to-old age class would be regenerated to a 0-to-39-year age class.	20 acres of a mixed-conifer cover type and 21 acres of a subalpine fir cover type would move towards a western larch/Douglas-fir cover type after harvesting and planting.
16	24	14 acres of 100-to-old age class would be regenerated to a 0-to-39-year age class.	No change

As shown in the Chapter III diagrams *(Figure III-2 and III-3)*, mixed-conifer and subalpine fir cover types are presently overrepresented on Stillwater State Forest, in reference to appropriate conditions. The proposed harvesting alternatives would change the species composition in harvest units, thereby changing the cover-type classification to cover types representative of those that appropriately occupied these sites. In the process of altering the existing cover types, there will be changes to age-class distribution throughout the project area. Approximately 190 acres would be regenerated with a seral species mix. The regeneration harvests would be accomplished through a mix of group-select openings, seedtree treatments, and clearcutting *(see Table II-1 for individual unit treatments)*. The harvest prescriptions for the remaining acres consist of more selective thinning treatments, which would not effect the average age class.

Under proposed Action Alternative B, approximately 246 acres of old growth would be entered with harvest treatments. Approximately 55 of those acres would be converted to a younger-aged stand through a regeneration treatment. Through selective thinning of the encroaching shade-tolerant understory, many residual stands will still have a high level of old-growth attributes and the age classification will not change immediately.

An overall summary of the information in *Table IV-1* is found in *Table II-2, Summary of Environmental Effects*.

Cover-type conversions would result from the thinning or removal of the existing understory. Many of these conversions would be direct effects of the harvest prescription and would take place immediately. Removing lodgepole pine and shade-tolerant species (Engelmann spruce, grand fir, and subalpine fir) from a well-distributed western larch/Douglas-fir stand, would immediately convert that stand from a mixed-conifer cover type to a western larch/Douglas-fir cover type. An indirect effect of harvesting might take place where the stand conversion was not immediate. In this instance, the removal of shade-tolerant species from a stand that has only very scattered mature western larch or western white pine would result in an open stand that would require planting or several years to regenerate before a new cover type may be assigned.

Cumulative Effects

- ***Common to Alternatives A and B***

Past timber sales and wildfires have led to the current age class and cover type in this area. Future salvage sales and thinning projects, including those already mentioned in Chapter I, would likely continue to take place in the analysis area. As additional management projects are proposed, analysis work and a decision process would continue to take place.

Cumulative effects of concurrent projects (Beaver Lake and Chicken/Werner timber sale projects) are expected to increase the amount of western larch/Douglas-fir cover types on Stillwater State Forest by approximately 1,115 acres. This trend towards a seral cover type would result in reductions of the same number of acres in mixed-conifer, subalpine fir, and older lodgepole pine cover types across the forest.

Changes in the age classes on Stillwater State Forest would include an increase of 782 acres of 0-to-39-year-old stands where regeneration-type harvests are part of the Good/Long/Boyle, Beaver Lake, and Chicken/Werner timber sales. This increase in younger age-class acres would result in a decrease of 99 acres of 40-to-99-year-old stands, 298 acres of 100-to-149-year-old stands, and 422 acres of 150+-year-old stands across the forest due to the upcoming timber sales. As older stands are harvested over time, those acres would trend toward a younger age class and would be considered part of the 0-t-39-year-old classification. Eventually, younger stands in all age classes on Stillwater State Forest would increase in size as they grow older, thus, allowing them to shift up to the next age class where they would replace other stands that are moving into an older age class.

Tally Lake Ranger District, USFS, completed their Good Creek Resource Management Project FEIS in March of 2000. The analysis area for that project is adjacent to the western boundary of the Good/Long/Boyle Timber Sale Project area. Refer to this FEIS and Record of Decision for a summary of the anticipated changes to cover type and age class on adjacent USFS lands.

Plum Creek Timber Company is intensively managing their lands. On Plum Creek's ownership adjacent to the project area, a higher percentage of acres in younger age classes of seral species are replacing the older stands that occupy those sites now. This would decrease the average age of forest stands in the general vicinity of the project area. The mixed-conifer and subalpine cover types are likely to trend towards more seral species components (western larch, lodgepole pine, Douglas-fir, and western white pine) as the dominant canopy is opened up.

- ***No-Action Alternative A***

  Mature stands will become increasingly multistoried as the current overstory dies and is replaced by patches of regenerated shade-tolerant species.

  Barring natural events, the frequency of disturbance would decrease in the absence of proposed management activities. Wildfire would continue to be suppressed; however, if a fire escaped initial attack, more severe burns and higher tree mortality would be expected.

  The relative abundance of shade-tolerant trees in older stands would continue to increase.

- ***Action Alternative B***

  As with No-Action Alternative A, many of the same cumulative effects are applicable with the implementation of Action Alternative B:

  - Wildfires would continue to be suppressed, and escaped fires would likely be lethal due to past suppression; however, thinning harvests often lessen the risks of large-scale fires by removing many of the ladder fuels and less fire-resistant tree species.

  - Following a harvesting alternative that retains older, seral tree species, stands will become increasingly multistoried as the mature overstory dies. Unlike No-Action Alternative A, however, shade-intolerant species will take the place of shade-tolerant trees and provide replacements for older serals that die out.

  - Through harvesting methods that change species composition, units harvested under Action Alternative B would regain appropriate cover types with some old-growth attributes more rapidly than stand-replacement fires or regeneration harvests would allow. The resulting matrix of old-growth stands and old-growth replacement candidates would help DNRC meet their target for appropriate old-growth acres over the long term.

Patch Characteristics

Patch size and shape do not change significantly with implementations of the proposed actions on this sale. Detailed information is available in the project file at the Stillwater State Forest office in Olney.

Old Growth

Analysis Methods and Area

See Chapter III.

Effects to Old-Growth Commitments at the Landscape Level (Stillwater State Forest)

The following information includes:

- the direct, indirect, and cumulative effects to the amount of forestwide old growth and considers past harvesting;
- current projects where a decision has been made, but harvesting has not yet occurred; and
- estimated effects from proposed alternatives on the Good/Long/Boyle Timber Sale Project.

Activities on adjacent ownership are not part of the cumulative effects equation when it comes to old-growth commitments on State lands. DNRC's commitments to maintaining old growth (refer to the SFLMP) do not address the amount of old growth on adjacent public or private lands.

Direct, Indirect, and Cumulative Effects

- ***No-Action Alternative A***

  No-Action Alternative A would have no direct effect on the current amount, distribution, or value of old growth on the forest. Over time, the percentage of mixed-conifer and subalpine fir cover types may increase slightly due to the lack of disturbance and continued fire suppression. Other timber sales on Stillwater State Forest are currently being harvested and would convert mixed-conifer and subalpine fir cover types to western larch/Douglas-fir cover types; thus, offsetting the effect of no action on this project at the landscape level.

- ***Action Alternative B***

  Harvesting proposed under Action Alternative B would directly affect the overall old growth on the forest through a reduction of 55 acres that are being regenerated. The amount of total old-growth acres on the forest would cumulatively decrease through the harvesting of another 367 acres in other ongoing and upcoming timber sales, Beaver Lake Timber Sale Project 2000, and Chicken/Werner Timber Sale Project. Over time, younger stands in all age classes on Stillwater State Forest would increase in size as they grow older and shift to an older age class, eventually replacing harvested acres in older stands.

Old-Growth Representation at the Project-Area Level (Good/Long/Boyle)

Direct and Indirect Effects

- ***No-Action Alternative A***

  The amount, character, and distribution of existing old-growth stands would remain the same within the project area for the short term.

  During the short term, fire-suppression efforts would likely maintain the existing old-growth structure. Continued fire suppression would increase the risk of stand-replacement-type fires that would likely consume most of the old growth in its path.

  Existing open roads would continue to provide access to firewood gatherers.

  Existing cover types would change, over time, with natural plant succession.

- ***Action Alternative B***

  The proposed harvest treatment would decrease the amount of old growth by 55 acres within the Good/Long/Boyle Project area. Because harvesting in old-growth western larch/Douglas-fir stands was deferred, harvesting would take place primarily in old subalpine fir and mixed-conifer cover types, which are overrepresented on the forest and within the project area.

The treatments proposed in old-growth stands would retain most of the large trees and favor the retention of western larch, Douglas-fir, western white pine, and other dominant seral trees or snags. These stands have been entered with timber-harvesting projects in the past; therefore, retaining the largest trees would ensure that some old-growth attributes are represented within the project area for future management options.

Table IV-2 shows the harvest units for Alternative B that encompass portions of old-growth stands; units without old-growth acres were not included. Many of the stands that meet DNRC's old-growth definition have very reduced old-growth attributes due to past harvesting practices and wildfire activity. This table also specifies the amount of total unit acres, old-growth-defined acres, and the expected number of acres that would remain in old growth following the described harvest treatment. The number of old-growth acres is marginally reduced where stands are entered and a high amount of the older dominant trees and volume are retained. Refer to the following section on old-growth attributes for a summation of old-growth characteristics affected with each alternative.

Cumulative Effects

Common to Alternatives A and B

Past road construction, timber sales, and wildfires have led to the current amount of old-growth characteristics in this area. It is likely that future salvage sales and thinning projects, including those already mentioned in Chapter I, would continue to take place in the

TABLE IV-2 - EXPECTED EFFECT OF HARVEST TREATMENT ON OLD-GROWTH ACRES IN PROPOSED HARVEST UNITS

UNIT #	TOTAL ACRES ENTERED	ACRES WITH OLD-GROWTH DEFINITION	HARVEST TREATMENT	ACRES OF OLD GROWTH AFTER HARVESTING
4	15	11	Modified seedtree/ shelterwood w/reserves	11 (no change)
15	41	20	Modified seedtree w/reserves and group-select openings	11
6	215	77	Modified seedtree/ shelterwood w/reserves	53
8	104	58	Modified seedtree/ shelterwood w/reserves	58 (no change)
10	59	21	Seedtree and clearcut w/ reserves	11
13	123	43	Improvement cut/seedtree w/ reserves	43 (no change)
12	16	15	Modified seedtree/ shelterwood w/group select.	3
Totals		245		190

analysis area. If additional management projects were proposed, the MEPA process would be implemented.

Plum Creek Timber Company is managing their lands intensively and has not committed to any old-growth retention on their ownership. The remaining older stands would likely be harvested over time, which would diminish the amount of old growth in the general vicinity of the project area.

The Tally Lake Ranger District's (USFS) Good Creek Resource Management Project NEPA work has been completed and a ROD has been published. Approximately 5,671 acres would be treated with commercial timber harvests over a 7-year period. No old-growth harvesting will take place. Refer to the Good Creek Resource Management Project EIS or ROD for information that is more detailed.

Old-Growth Attributes (Good/Long/Boyle Project Area)

The following list illustrates a comparison of effects to old-growth attributes, based upon the alternative chosen. As mentioned under the same section in Chapter III, there are 6 attributes that tend to characterize forests in the latter stages of development (listed below). Effects to each are analyzed.

Tree Vigor/Decadence

Direct and Indirect Effects

- ***No-Action Alternative A***

  A combination of increased stocking density, mortality, and overall stand age should lead to a reduction in stand vigor and an increase in the decadence of old stands within the project area.

- ***Action Alternative B***

  When using stand vigor as a surrogate for decadence, the old stands being entered would likely decrease in decadence slightly as vigor increases due to increased light, nutrients, and water for residual trees. On a landscape level, to maintain some stands with a large amount of decadence for diversity is desirable. In the case of the Good/Long/Boyle Project area, this opportunity does not exist because all old-growth stands in the harvest proposal have a good-to-average vigor rating.

  The trees planned for retention in these old-growth stands are already mature or quite old; therefore, a growth response to a thinning may not be noticeable. Some species will not respond to thinning after they reach 50 to 70 years of age, while other species may have an increased rate of growth. In either case, the stands that show increases in vigor are likely to decrease again over time as stocking densities increase.

Cumulative Effects

Common to Alternatives A and B

Whether or not Action Alternative B is chosen, stocking densities would increase over time. If management activities on State trust lands do not occur at regular intervals, stand vigor would be reduced due to competition, mortality, insect infestations, and diseases. In the short or long term, a potential wildfire would likely reduce stocking densities and improve the level of vigor in the project area. Current and future management activities (see Chapter I) would increase stand vigor throughout the analysis area as stands are released through thinning.

Stand vigor on Plum Creek Timber Company land should increase due to the intensive management that would likely continue.

The adjacent USFS stands should see an increase in vigor as the Good Creek Resource Management Project is implemented.

Stand Structure

Direct and Indirect Effects

- ***No-Action Alternative A***

  Barring a natural occurrence such as a wildfire, an increasing trend toward a multistoried stand structure will continue as shade-tolerant species fill in the understory.

- ***Action Alternative B***

  The stand structure would resemble those conditions typical of a low-to-moderate-intensity wildfire where thick-barked dominant seral trees survive and a 2-storied structure develops over time. Unlike the existing multistoried structure composed of dominant serals and a midstory of shade-tolerant species, the projected effects of Alternative B should ensure more seral species in all canopy layers of the future multistoried stands.

Cumulative Effects

Common to Alternatives A and B

Ongoing activities across State land would help move the overall landscape condition of fewer layers in the canopy and more serals in the species mix, as opposed to the high percentage of multistoried mixed-conifer old-growth acres found in the existing condition.

Results of harvesting activity on adjacent ownership (USFS and Plum Creek) would not affect the State's old-growth structure to any quantitative degree.

Stocking Level (volume per acre)

Direct and Indirect Effects

- ***No-Action Alternative A***

  Without timber harvesting, insect infestations, or wildfires in the near future, stocking levels throughout the project area would continue to increase over time.

- ***Action Alternative B***

  Stocking levels would be reduced within the project area for the short term. As new seedlings are established and residual trees increase in size, the stocking level would increase over the long term.

Cumulative Effects

Common to Alternatives A and B

Timber harvesting, fires, and insect infestations tend to reduce stocking levels in the short term and, exponentially, increase volumes and stocking levels over the long term. Through natural or artificial disturbances, trees are more likely to release and increase in volume when they are thinned.

Snags Per Acre

Direct and Indirect Effects

- ***No-Action Alternative A***

  The number of snags would increase in the short term; in the absence of large-scale wildfires, the number of snags would also increase over the long term.

- ***Action Alternative B***

  The overall amount of snags per acre may decrease slightly due to harvesting activities. Suppressed or diseased green trees that have the potential to become snags may also be harvested as part of this proposal, thereby reducing the amount of future snags per acre. Large snags and live broken-topped culls, those most valuable to wildlife, would be designated for retention wherever Occupational Safety and Health Administration (OSHA) regulations are met.

Clumps of adjacent trees would be marked for retention to protect snags/culls during harvesting activities.

Logging contractors would be required to plan skidding activities to protect snags.

Cumulative Effects

Common to Alternatives A and B

Given the moderate level of insect and disease activity in the project area, the number of large snags would increase over time.

At the landscape level (Stillwater State Forest), other ongoing timber sales and proposed actions would probably decrease the amount of large snags over the short term because some of the harvested live trees would eventually become snags.

The ongoing harvesting of snags for firewood, which probably only occurs within 300 feet of open roads, would continue.

USFS and Plum Creek have a similar policy for retaining snags and cull trees for wildlife habitat on their lands. As with State trust lands, since some potential snags are being harvested in the form of green trees, there may be, in the long-term, less potential for as many snags where harvesting occurs.

Coarse Down Woody Material

Direct and Indirect Effects

- ***No-Action Alternative A***

  The amount of large coarse woody material on the ground in old-growth stands should increase over time as more large-tree mortality takes place.

- ***Action Alternative B***

  Due to mitigation measures that require on-site retention of up to 15 tons of large and small woody material for nutrient cycling, the amount of coarse woody material would increase in the project area. These mitigation measures are clearly specified in DNRC's timber sale contracts, which are enforced by sale administrators during harvesting operations. On-site administration ensures that nutrient cycling takes place, while still meeting the hazard reduction of minimizing the risk of wildfire. Much of the cull material (greater than 15 inches in diameter) is left on-site as wildlife habitat and to provide nutrients for forest soils.

  Over the long-term, by decreasing stocking density, there would be fewer large woody recruits and the amount on the ground would decrease to some degree.

Cumulative Effects

Common to Alternatives A and B

Over time, along with other proposed sales on State, USFS, and Plum Creek Timber Company lands, existing snags, snag recruits, and diseased trees would fall and continue to replace decomposing coarse woody material. These accumulations on the forest floor are directly related to the frequency and severity of fire.

Large Live Trees

Direct and Indirect Effects

- ***No-Action Alternative A***

  The amount of large live old-growth trees would likely stay the same for the short term and decrease over time as more large-tree mortality takes place.

  The average diameter of large live trees would continue to increase at the current rate of growth in the short term.

- ***Action Alternative B***

  In order to maintain large dominant serals, all large trees would be retained in the old-growth stands. Some suppressed or diseased large trees may be harvested when the risk of crowding or disease spread is a concern.

  Reducing stocking levels will likely decrease the stress on remaining trees, which would increase vigor and resistance to insect and disease mortality.

  Where trees are thinned and vigor rates increase, the remaining "almost large" trees (17-to-20-inch dbh class), are likely to become large trees (over 21 inches dbh) sooner than they would have prior to harvesting.

  The reduction of stocking levels in a stand does increase the risk of blowdown; however, since these stands have been entered before and the stocking level is not extremely dense, most of these trees should be fairly windfirm. Those trees targeted for retention (Douglas-fir, western larch, western white pine, and ponderosa pine) are known for their deep root systems and resistance to blowdown.

Cumulative Effects

Common to Alternatives A and B

Past management practices on State trust lands led to the low level of large trees in some stands, while current management practices favor larger trees and snags. Proposed actions and ongoing timber sales on Stillwater State Forest may increase, over time, the number of large live trees through stand release and large live tree retention.

See the USFS Good Creek Resource Management Project EIS for a list of harvest prescriptions and mitigations that would affect the level of large live trees in adjacent old-growth stands.

Intensive forest management on Plum Creek ownership would likely contribute to a decrease in the amount of large live trees (17 inches dbh) over time.

OTHER RESOURCES CONSIDERED IN THE PROJECT AREA AND AT THE LANDSCAPE LEVEL

See Chapter III, Methods and Analysis Area.

AIR QUALITY

Direct and Indirect Effects

- ***No-Action Alternative A***

  No-Action Alternative A would not create impacts to air quality beyond existing levels.

- ***Action Alternative B***

  Depending on the season, log hauling and other traffic on dry roads may increase the amount of road dust, thereby reducing air quality. Log hauling via the south entrances of Martin Camp and Lupfer roads to Highway 93 would contribute the most impact from road dust because local residents use these roads. Depending on the amount of traffic and season that log hauling occurs, dust abatement may be applied along portions of these roads. Log hauling along the USFS Road 60E, between the Star Meadows and Good Creek roads, may require the same mitigations during a dry season (see Appendix A, Stipulations and Specifications).

The postharvest burning of logging debris would produce particulate matter. The smoke columns generated by burning most likely would not reach populated areas in Flathead County. The stipulations and specifications listed for air quality in Appendix A should prevent road dust from impacting populated areas and limit the impacts from burning to levels not exceeding EPA/State/County/local standards.

Cumulative Effects

Common to Alternatives A and B

Over the long term, road dust during summer months would likely increase as recreational traffic increases.

Cumulative effects to air quality would not exceed the levels defined by the State of Montana Cooperative Smoke Management Plan (1988) and managed by the Montana Airshed Group.

Prescribed burning and hazard reduction on USFS, Plum Creek Timber Company, and adjacent State trust lands would have the potential to affect air quality; however, these entities currently operate under the same Airshed Group guidelines as the State and would burn only on approved burn days.

AESTHETICS

Existing visual characteristics are described in Chapter III from various viewpoints.

The project area is not highly visible from any distance; the results of implementing Action Alternative B would have visual impacts primarily from open roads. As a mitigation measure for providing wildlife with visual screening, vegetative buffers along open roads would be left wherever possible. In order to minimize visual impacts, one or more of the following measures would be taken:

- Individual trees would be left along unit edges to feather the sharp contrast between logging units and heavily-stocked forest stands; wherever applicable, unit boundaries would be marked in shape to emulate natural wildfire disturbances.

- A relatively high volume of mature trees would be left as residuals to help minimize visual impacts.
- It should be noted that some stands contain a high percentage of western larch, which would not provide effective visual buffers or screening in the winter months. This would be taken into consideration where other options exist.

The effects of the harvest treatments would be most notable to visitors along the open roads within the project area. The Description of Silvicultural Treatments in Chapter II provides graphical effects of the proposed treatments.

Direct and Indirect Effects

- *No-Action Alternative A*

  If Alternative A were selected, views of the project area would not change.

- ***Action Alternative B***

Harvesting under Action Alternative B would have very little effect on the aesthetic value of Units 1, 7, 11, and portions of 6; these units would be commercially thinned and the residual stand would still be fully stocked.

Within Units 2, 3, 9, 10, 14, 15, and 16, even though the largest and healthiest trees would be left, the stands would be opened up significantly where suppressed lodgepole pine and shade-tolerant white woods are harvested. The effects of harvesting would likely reduce the short-term aesthetic value of these particular units (approximately 308 acres) until logging slash is burned or decomposes. Once natural regeneration, grasses, and shrubs are established, combined with trees being planted, the visual character of the stand would improve over time as it does in the aftermath of a wildfire or other natural disturbance.

The prescriptions for Units 4, 5, 6, 8, 11, 12, and 13 were designed to retain old-growth and potential old-growth characteristics, thereby minimizing the effect on existing aesthetic value. Examples of past harvest treatments to similar stands are found throughout Stillwater and Coal Creek State forests; postharvest volumes range from 5 to 12 MBF per acre and approximately 10 to 20 large trees, depending upon the size, quality, and distribution of the trees prior to harvesting. Snags, snag-recruitment trees, and downed logs are maintained. These stands are scarified, burned, and, oftentimes, planted to encourage the rapid establishment of Douglas-fir, western larch, and western white pine; these are seral species that are underrepresented when compared with historic stand conditions.

Cumulative Effects

Common to Alternatives A and B

Excluding natural events such as wildfire, blown down timber, insect outbreaks, and disease-related mortality, views from the previously mentioned viewpoints *(Chapter III)* would not change on State ownership in the near future.

Timber harvesting on adjacent sections would likely continue and may be visible on the landscape.

Plum Creek Timber Company would likely continue to manage their lands intensively; future harvesting would have fewer visual impacts than in the past due to an emphasis on retaining hiding cover for grizzly bears. A Habitat Conservation Plan with USFWS requires residual hiding cover for grizzly bears on Plum Creek Timber Company's Seeley Lake Unit in the Swan Valley. Plum Creek is currently using the same mitigations for grizzly bears on their ownership adjacent to Stillwater State Forest.

USFS has published a Record of Decision on the Good Creek Resource Management Project FEIS; 3 harvest units are within 1 mile of the Good/Long/Boyle Project area. Two units are not visible from any particular vantage point in the project area and would not likely reduce aesthetic value from the Good/Long/Boyle Project area or Stillwater State Forest as a whole. A Good Creek unit with a "heavy dispersed retention" harvest, shares the same boundary as Good/Long/Boyle's Unit 1 and would have minimal impacts on the Good/Long/Boyle Project area since a scattered residual stand would remain.

ROADS AND TRANSPORTATION SYSTEMS

A detailed description of the existing road condition in the project area is in Chapter III; *See the Timber Sale Area Map* for the proposed changes to the existing road system.

Direct and Indirect Effects

- ***No-Action Alternative A***

  If Alternative A were chosen, the road improvement package would not be implemented. The following direct and indirect effects would likely occur throughout the project area:

  - Standards would remain the same or deteriorate unless other sources of money are made available for routine maintenance.

  - Existing roads would remain in their current condition.

  - Improvements, in the form of gates, additional closures, and bridges, would be funded through other projects at a later date.

- ***Action Alternative B***

  Several road systems that currently have closures (barriers, gates, tank traps, rocks, etc.) would be closed more effectively with this project. To minimize road maintenance needs, noxious weed spread, and wildlife disturbance, 4 open road segments would be closed. These include segments of the Martin Camp B-Line and B-100 spur, as well as the A-200 and A-800 spurs off Martin Camp A-Line (see Figure II-2).

  The Martin Camp and Lupfer roads have been recently reconstructed and meet or exceed minimum BMPs. If Action Alternative B were selected, both roads would require minimal improvement work to ensure all drainage features are adequate for the duration of the project activities. As described in Chapter III, several existing access spurs require minor maintenance and repair work before minimum BMPs would be met. The same is true for the access spurs into Section 1 (Goat Trail Road spurs 100, 110, 120, 130, and 140). The West Fork bridge would also be replaced as part of this project (*see details in Chapter III*).

Cumulative Effects

Common to Alternatives A and B

The cumulative effect of other adjacent road systems used for recreation, hunting, fishing, and woodcutting would probably continue to increase the slow spread of noxious weeds over time as more people live and recreate in the Flathead area. Cumulative effects from activities on adjacent ownerships would effect the project area and analysis area (Stillwater State Forest) through increased wear and tear on State forest road systems wherever reciprocal access is taking place; shared maintenance help offset costs.

Requests have been received from private individuals for easements. The proposed routes would lead from the end of Martin Camp Road, north on existing roads into private ownerships located in Sections 20, 28, and 29, T32N, 23W. Potential impacts from granting these easements would be increased traffic, road dust, noxious weeds, etc. A separate EA will be conducted for any easement request on State land.

ECONOMICS

Methods

The basic method for the economic analysis is a nondiscounted cash flow. The cash-flow analysis tries to estimate the flow of revenues and costs from the different treatments that are related only to this project. Due to the fact that projecting treatments into the future is uncertain due to changes in policies, markets, personnel, and natural events, no future activities are included . The analysis estimates the cash flow from timber harvesting and nonadministrative costs for the alternatives considered. DNRC does not have a formal accounting system to track costs for individual projects from start to finish. An annual cash-flow analysis is conducted of DNRC's forest-product sales program. The results from previous years can be found in Chapter III.

The results of the nondiscounted cash flow analysis appear in *Table IV-3 through Table IV-5*.

Assumptions

Alternatives A and B

The following assumptions were used to estimate the revenue and nonadministrative costs for each alternative:

- Costs, revenues, and estimate of return are estimates intended for relative comparison of alternatives. They are not intended to be used as absolute return values.
- The harvested volumes for the alternatives were based on estimates made by Stillwater Unit personnel.
- The stumpage price was estimated using the current Transaction Evidence equation.
- All of the proposed sale will be harvested by conventional tractor.
- The Action Alternative B development cost for the proposed project is estimated to be $180,000. This includes $120,000 for replacement of the West Fork bridge and $60,000 for roadwork. Development costs for this proposal are the estimated costs of road construction and reconstruction, road obliteration, and watershed improvements that would provide access to the involved State trust lands and improve water quality on State land. The Purchaser is required to do the work as part of the Timber Sale Contract. Development costs are a factor used in the current Transaction Evidence equation.
- The FI fee is based on programwide costs and the cost to maintain the ongoing staffing, treat stands, maintain roads for the current year, and acquisition rights-of-way. Money collected under FI from a purchaser provides funding for the State to accomplish projects such as tree planting, site preparation, slash treatment, thinning, road

TABLE IV-3 - SALE-SPECIFIC FOREST-IMPROVEMENT COST BY ALTERNATIVE AND METHOD

SALE-SPECIFIC FOREST-IMPROVEMENT COST	NO-ACTION ALTERNATIVE A	ACTION ALTERNATIVE B
Interplant	0	$25,024
Site preparation - moderate excavator ground	0	$24,510
Total nonburning cost only	0	$49,534
Total burning cost only	0	$54,400
FI collected by alternative	0	$236,552
Total cost per MBF	0	$20

maintenance, rights-of-away acquisitions, and some timber-sale-related activities. Thus, DNRC is able to improve the long-term productivity of timber stands on State trust lands and maintain or acquire access for future revenue-producing projects. The current FI fee for the NWLO is $46.41 per MBF.

- The sale-specific forest-improvement (SSFI) costs are the current cost estimates for the amount and types of treatments (site preparation, hazard reduction, planting, etc.) planned for each alternative being considered. Funding to complete these projects will be collected from current or future timber sales, depending on the timing of the treatments. These projects are funded with the FI fee ($46.41 per MBF). The FI fee is collected from timber-harvesting projects.
- The estimated total timber dollar return to the trust is the estimated stumpage price (winning bid price per MBF) multiplied by the estimated harvest volume.
- The estimated total timber dollar amount collected by the State (total revenue) is: FI costs + the estimated stumpage price x the estimated harvest volume.
- The SSFI costs are based on the following costs and proposed treatment acres:
  - excavator site preparation = $95 per acre for an estimated 258 acres;
  - interplanting = $46.00 per acre (100 trees per acre (TPA) x $0.46 per tree) for an estimated 544 acres;
  - jackpot/broadcast burning = $100 per acre for an estimated 544 acres.

TABLE IV-4 - COSTS AND BENEFITS ASSOCIATED WITH THIS PROJECT BY ALTERNATIVE

COSTS AND BENEFITS	**A**	**B**
1. Estimated total harvest volume (MBF)	0	5,079
2. Development cost ($/MBF)	$0	$36
3. Estimated stumpage value ($/MBF)	$0	$200
4. FI ($/MBF)	$0	$46.41
5. Estimated stumpage value, FI, and development cost ($/MBF) (Line 2 + line 3 + line 4)	$0	$282.41
6. Total timber dollar value based on estimated stumpage value, FI cost, and development cost multiplied by the estimated harvest volume (line 5 * line 1)	$0	$1,434,360
7. Estimated stumpage value and FI ($/MBF) (line 3 + line 4)	$0	$246.41
8. Total timber dollar revenue to the State (estimated stumpage value + FI cost multiplied by estimated harvest volume) (line 7 x line 1)	$0	$1,251,516
9. Total timber dollar return to the trust (line 1 x line 3, does not include administration costs)	$0	$1,015,800
10. Total dollar SSFI Costs (**Table IV-3 - total of costs**)	$0	$ 236,552
11. SSFI Costs ($/MBF) (line 11/line 1)	$0	$ 20

Some of these projects may be delayed due to weather or future budget constraints.

The costs related to the administration of the timber sale program are only tracked at the Land Office and Statewide level. A formal accounting system is not in place to track costs of individual timber sales.

DNRC has a Statewide sustained-yield volume level of 42.164 MMBF per year. If DNRC does not select the harvest alternative in this project, a relative amount of timber would be sold and harvested on State land elsewhere.

Currently, DNRC is not generating revenue from another source that is wholly dependent upon this project area. A couple of landowners want to obtain permanent access and may pay the State for rights-of-way into Section 29 on the west side of Stillwater River if the price is right. Their other option is to build a bridge across Stillwater River.

Limitations of the economic analysis:

- Only known costs and benefits that are associated with the activities are considered (Table IV-4).
- None of the potential benefits associated with leaving trees (ie. snag recruitment, structural diversity, aesthetics, wildlife habitat, nutrient recycling, etc.) are considered.

Estimated Direct Revenue from the Alternatives Considered

Direct Effects on Jobs and Income

No-Action Alternative A

No additional jobs or immediate revenue are expected.

Action Alternative B

The impacts on local communities are estimated by quantifying jobs and income associated with harvesting and processing the timber into final products. Regional response coefficients estimated for northwestern Montana indicate that timber harvesting provides:

- 10.58 direct jobs per MMBF,
- a total direct income of $337,146 (Keegan et al.)
- for an average annual income of $ 31,866.35 per job.

It is important to note that the response coefficients are an accounting of what has happened historically. These response coefficients are average values and not marginal values. To say the consequence of not selling this sale would result in the loss of XX amount of jobs and YYY amount of income may not be correct. A marginal analysis would have to be done in order to be more certain that there would be a reduction in income and employment. Lack of a marginal analysis and the use of average numbers commonly results in overestimation of the total economic effects *(Godfrey and Beutler 1993)*.

Other Sources of Revenue to the Trust

Direct and Indirect Effects

Alternatives A and B

Whether Action Alternative B is implemented or not, the State may choose to increase the amount of road closures, thereby reducing recreational opportunities for those who cannot or will not use areas where motorized access is prohibited.

The current revenue from commercial and recreational leases and licenses should continue to increase over time, independent of either alternative. The ability to generate the same level of funding as American Timber Company currently pays for their lease is speculative. Recreating on Stillwater State forest requires purchasing Recreational Use Licenses; based on recent surveys, compliance is poor. Due to the low amount of income generated through the sale of Recreational Use License, the cumulative effect of increased recreational use is not expected to increase income significantly.

Cumulative Effects

Alternatives A and B

The last survey of Montana's forest products industry was done in 1994 *(Keegan et. al. 1995)*. *Table IV-5* (next page) describes the cumulative effects of wood supply to the regional forest products industry. The long-term impacts are difficult to assess given today's global markets. The importance of State timber sales to the regional economy is dependent upon the wood supply originating on USFS, private nonindustrial, private industrial, and tribal lands.

The following mill capacity estimates are from Montana's Forest Products Industry "A Descriptive Analysis" 1969-1994 (Keegan et al. 1995).

In Lincoln and Flathead counties, the proposed Good/Long/Boyle Timber Sale Project proposal represents approximately 1% of the forest product capacity and processing for a single year. The estimates of local wood products processing were similar to mill capacity and are located in the project file at Stillwater Unit.

TABLE IV-5 - DIRECT AND CUMULATIVE EFFECTS OF WOOD SUPPLY TO THE REGIONAL FOREST PRODUCTS INDUSTRY

COUNTY	ANNUAL CAPACITY OF LOCAL MILLS (MMBF)*	CONTRIBUTION (BY PERCENT) TO LOCAL MILL VOLUME (ANNUAL CAPACITY)**		
		DNRC'S NWLO ANNUAL TARGET OF 24 MMBF	NO-ACTION ALTERNATIVE A	ACTION ALTERNATIVE B
Lincoln	144	17%	0%	3%
Flathead	179	13%	0%	3%
Lake/ Mineral/ Sanders***	180	13%	0%	3%
All Counties	503	5%	0%	1%

**Mill Capacity was reduced by 10% to reflect recent reduction in capacity (personal communication with Chuck Keegan 1999). Flathead County's capacity was reduced by 100 to reflect the impending loss of American Timber Mill in Olney.*

***Based upon NWLO's harvest history, that all of the State timber sale volumes would stay in one county is unlikely. In most cases, State timber is distributed to mills throughout several counties; therefore, the contribution of sale volumes to "All Counties" is the most likely effect of NWLO Sales. If Action Alternative B were selected, it is likely that the sale volume would stay in Lincoln and/or Flathead County and direct effects of the sale would be on the capacity in those 2 counties.*

****Additional timber sale volume from the DNRC's Southwestern Land Office (SWLO) was not included in this analysis for the northwestern portion of the State. Had those figures been included, DNRC's timber volume contribution to Mineral county would have been higher.*

Water Yield

Direct and Indirect Effects

- ***No-Action Alternative A***

  No timber harvesting or road-drainage improvements would be implemented. Water yield would continue in a natural decline as vegetative recovery takes place or until another project is implemented.

- ***Action Alternative B***

  Approximately 744 ECA, which is partitioned between all the watersheds within the project area, will be generated form this project. In the Good Creek watershed, approximately 148 ECA would be generated from this project. This would equate to an approximate 0.1% increase in annual water yield. Considering the channel morphology (characteristics), this increase is not likely to trigger any additional in-stream erosion.

  In the Long Meadow watershed, an additional 23 ECA would be generated form this alternative, which equates to an approximate 0.2% increase over the existing conditions.

  This alternative would increase the ECA by 573 in the Stillwater River watershed from face drainages along the watercourse. Considering the existing condition of the Stillwater River and the lakes associated with the system, the additional ECA is not likely to result in a measurable water-yield increase.

  This alternative does not include water-yield-increasing activities for the West Fork of Swift Creek; therefore, the implementation of this alternative would not result in a annual water-yield increase for this watershed.

  The Stillwater River watershed will receive an additional 573 ECA from this alternative. Considering the channel conditions discussed in *Chapter III*, adverse cumulative effects are not likely to result from this alternative.

Cumulative Effects

- ***No-Action Alternative A***

  Cumulative watershed effects would not result from this alternative due to no additional ECA generation. However, other projects in the drainage, such as the USFS Good Creek Timber Sale, would continue to be implemented. Water yield increases associated with the Good Creek Timber Sale include a 9% annual water-yield increase over natural levels in the Good Creek watershed.

  The Long Meadow watershed would not experience any additional water yield increases. Water yield would actually diminish as vegetative recovery progresses toward natural levels.

- ***Action Alternative B***

  As describe in Chapter III of this document, cumulative watershed effects to water yield were analyzed. Modeling for the Good Creek watershed was completed by the USFS in conjunction with the Good Creek Resource Management Project FEIS. Annual water yield increases took into account all present, past, and reasonably foreseeable actions, which included the Good Long Boyle Timber Sale proposal. Cumulative annual water yield increases for the Good Creek and Long Meadow watersheds are listed below in *Table IV-6*. The Good Creek and Long Meadow watersheds will remain below the thresholds set in accordance with SFLMP Watershed RMS #7; therefore, adverse cumulative effects are unlikely to result from the implementation of this alternative.

TABLE IV-6 - CUMULATIVE ANNUAL WATER YIELD INCREASES

Watershed	Good Creek	Long Meadow
Existing (Alternative A)*	8%	11%
Alternative B*	10%	11%
Threshold	14%	14%

**Includes the USFS preferred alternative.*

Water Quality

Direct and Indirect Effects

- ***No-Action Alternative A***

  No timber harvesting or road-drainage improvements would be completed. Current drainage problems on roads would continue until road-maintenance dollars become available. The poorly vegetated bank in Section 31, T32N, R23W, would continue to occasionally slump and contribute sediment to the system.

- ***Action Alternative B***

  Approximately 18.5 miles of road improvements would be implemented to improve road drainage. These improvements include drain dips, ditch-relief culverts, and culvert upsizing as needed. Mitigation would include installing culverts during the low-flow season. Due to the hydrologic nature of the streams in this area, a no-flow period is likely to occur and culverts would be installed during this time. All pertinent laws and regulations would be followed regarding SMZs and BMPs to limit sediment introduction into stream channels.

  Due to the harvest units being located away from the scoured streams in the Long Meadow watershed, increased sediment resulting from harvesting is unlikely. Additionally, the series of seasonal wetlands in the Long Meadow watershed will effectively filter any sediment from downstream areas. Since this stream does not connect to the Stillwater River system via surface flow, the potential for sediment contribution is highly unlikely.

  Harvesting in the SMZ of perennial streams will not be permitted. Also, wetlands within the project area will be buffered to provide for wildlife security and increased sediment-filtering capacity. Due to the location of these units additional sediment introduction into the Good Creek system is unlikely. The poorly vegetated bank in Section 31 will continue to occasionally slump and contribute sediment to the system. No harvest units are planned adjacent to the bank.

  Units within the Stillwater River watershed are located away from the watercourse. The distances required by the SMZ law will be exceeded for all units within the Stillwater face drainages. The likelihood of sediment entering the river is low due to the location of units away from the Stillwater River and the generally flat topography with a deranged watershed pattern.

  In addition to the timber harvesting and road-drainage improvements associated with this alternative, a bridge crossing the West Fork of Swift Creek will be replaced with funds from this timber sale. All laws pertaining to water quality will be closely followed and all relevant permits (Streambed Preservation Act, Clean Water Act, etc.) will be obtained prior to replacing the bridge. The implementation of BMPs during the bridge replacement will limit sediment introduction into the West Fork of Swift Creek. No negative impacts to water quality are expected to occur during the bridge-replacement project.

Cumulative Effects

- ***No-Action Alternative A***

No timber harvesting or road improvements are associated with this alternative. Drainage problems on roads would continue until funding sources are obtained. The poorly vegetated Good Creek bank in Section 31, T32N, R23W, will continue to occasionally slump and contribute sediment. Cumulative watershed effects to water quality would still occur due to the USFS Good Creek Resource Management Project; cumulative effects are described in the Good Creek Resource Management Project FEIS. Pertinent portions of the Good Creek FEIS are found in the Appendix of this EA.

- ***Action Alternative B***

The annual water-yield increases of the watersheds within the project area will remain well below the threshold of concern set for each watershed; therefore, in-stream erosion rates are not likely to increase due to cumulative effects. Positive cumulative effects are likely to result from the USFS Good Creek Resource Management Project because several miles of roads and the associated stream crossings are being reclaimed, which will reduce the number of sediment sources in the Good Creek drainage.
Due to the location of the harvest units away from streams and the drainage improvements that would be implemented on the roads, adverse cumulative effects to water quality resulting from this alternative is unlikely .

In addition to the timber harvesting and road-drainage improvements associated with this alternative, a bridge crossing the West Fork of Swift Creek will be replaced with funds from this timber sale. All laws pertaining to water quality will be closely followed and all relevant permits will be obtained prior to replacing the bridge. The implementation of BMPs during the bridge replacement will limit sediment introduction to the West Fork of Swift Creek. No negative impacts are expected to occur to water quality during the bridge-replacement project.

Road-drainage improvements within the project area will provide for additional protection from sediment entering stream channels. All applicable BMPs will be implemented.

The DNRC Trust Land Management Division is rated for BMP implementation and effectiveness by an ID Team comprised of individuals from various State and Federal agencies, conservation groups, and private logging professionals. Ratings received from the audit team each biennium are published by DNRC's Forestry Division. The Trust Land Division has received high ratings for its BMP program. A complete list of the results can be found in the biennial audit reports published from 1990 through 1998.

Fisheries

Direct and Indirect Effects

- ***No-Action Alternative A***

Under this alternative, no timber harvesting or road-drainage improvements are planned. Therefore, there will be no direct or indirect effects to fisheries.

- ***Action Alternative B***

Timber harvesting and road-drainage improvements would be implemented under this alternative. The location of harvest units are well away from fish-bearing streams (no SMZ harvest is proposed on fish-bearing streams), and the water quality or channel characteristics are unlikely to be negatively affected by the implementation of this alternative. Without changes to the stream characteristics or water quality, fish habitat would not be adversely affected.

The bridge replacement on the West Fork of Swift Creek would not inhibit fish passage or migration. All required permits to protect the stream channel, water quality, and fish habitat would be acquired. No direct taking of bull trout is likely with the implementation of the following mitigations:

- All work must comply with BMPs.
- Activities would not take place during the migration period unless there is no flow in the stream.
- Activities would take place during the low- or no-flow season.

Cumulative Effects

- ***No-Action Alternative A***

  No timber harvesting or road construction is associated with this alternative. Cumulative impacts to fish would be limited to those described in detail in the *USFS Good Creek FEIS.*

- ***Action Alternative B***

  Units proposed under this alternative have been located well away from perennial fish-bearing streams in order to limit any potentially negative effects to fish habitat. Considering the physical stream characteristics associated with watersheds within the project area and the amount of timber to be harvested under Action Alternative B, additional cumulative effects to fish habitat is unlikely.

USFS has described potential cumulative impacts to fisheries in the *Good Creek Resource Management Project FEIS, which* has taken into account all past, present, and planned future actions, including the Good/Long/Boyle Timber Sale Project.

With the mitigation implemented, the West Fork of Swift Creek bridge replacement would not likely result in adverse cumulative effects to fish populations or fish habitat or violate the Endangered Species Act by resulting in a "take" of bull trout.

SOILS

Direct and Indirect Effects

- ***No-Action Alternative A***

  No timber harvesting or road-drainage improvements are associated with this alternative. Direct effects from this alternative are limited to the existing roads in need of surface drainage that are within the project area. Without surface drainage, water tends to form puddles on the road surface; as vehicles drive through the puddles, soil is displaced. Vehicles trying to avoid the puddles eventually compact soils outside of the engineered road prism. The soil compaction associated with this reduces soil productivity.

- ***Action Alternative B***

  Approximately 954 acres of ground-based timber harvesting (within the 1,207 acres of gross sale project acres) and 18.5 miles of road-drainage improvements are associated with this alternative. The road drainage improvements are necessary to bring roads up to BMP standards and reduce potential impacts described under No-Action Alternative A.

Soil compaction and/or displacement may occur on up to 15% of the project area in the form of skid trails and landings. Up to 143 acres of reduced soil productivity due to compaction/ displacement may result from this alternative. In order to reduce impacts to soil productivity, soil-moisture limitations will be placed on all units. Units that are located within areas of sensitive soils will require harvesting activities to take place during periods when soil moisture is no higher than 18%. Units located in areas where soils are not described as sensitive in Chapter III, will require harvesting activities to take place during peirod when soil moistrue is no higher than 20%. Soil moisture will be measured prior to beginning harvesting activities in each unit and whenever a substantial amount of precipitation has fallen.

Other mitigations to protect soil productivity include harvesting during winter. Winter operations may occur when the frost depth is at least 3 inches or the packed-snow depth is at least 12 inches. This mitigation will reduce the amount of soil that is compacted or displaced and protect soil productivity.

Cumulative Effects

- ***No-Action Alternative A***

  Under this alternative, no additional cumulative impacts associated with the Good Long Boyle Timber Sale Project proposal will be seen. Past harvesting has resulted in trails that access most of the proposed ground-skidding units. Most trails from past harvesting are scattered and revegetated, but some sites have reduced tree growth.

- ***Action Alternative B***

  Cumulative effects would occur from repeated entries into the harvest area. As long as detrimental soil effects are limited to less than 15% of the area, there should be a low risk of adverse cumulative effects. Besides the mitigation listed under direct and indirect effects, cumulative impacts to soil within the project area will be mitigated by using existing skid trails and landings. The total area of past and proposed impacts could reduce soil productivity on a maximum of 143 acres with the implementation of Action Alternative B. Skid trail planning signifying main trails to be used, general trail spacing, and additional trails needed would be incorporated into this alternative; where feasible, existing trails and landings would be used. Trails that do not comply with BMPs (bottom of draw or too closely spaced) would not be used and may be closed; additional drainage would be installed where needed to stabilize the site and improve conditions. Future stand entries in uneven-aged stands would use existing trails and landings.

A complete list of mitigation recommended to protect soil productivity is attached.

Recommended Mitigation Measures:

- Limit equipment operations to periods when soils are relatively dry (less than 20% for well-drained soils; less than 18% for sensitive soils), frozen, or snow covered to minimize soil compaction and rutting and maintain drainage features. Check soil moisture conditions prior to equipment start-up.

- The logger and sale administrator will agree to a general skidding plan prior to equipment operations. Skid trail planning would didentify main trails to be use and additional trails needed. Trails that do not comply with BMPs (ie. trails in draw bottom) would not be used and may be closed; additional drainage may be installed where needed or grass seeded may be sown to stabilize the site and control erosion.
- Tractor skidding should be limited to slopes less than 45%. Short steep slopes above incised draws may require, based on site review, a combination of mitigation measures, such as adverse skidding to ridge or winchline skidding from the more moderate slope, less than 45%.
- Slash Disposal- Limit disturbance and scarification to 30 to 40% of harvest units. No tractor piling on slopes over 35%. Consider lopping and scattering, or jackpot burning on steeper slopes. Accept disturbance incurred during skidding operations to provide adequate scarification for regeneration.
- Retain 10 to 15 tons of large woody debris and a large portion of fine litter following harvesting. This may be accomplished by either removing limbs and tops prior to skidding *or* returning skidding slash and distributing the slash evenly within the harvest area.

WILDLIFE

INTRODUCTION

In this chapter, the effects of the alternatives are addressed. The effects of Action Alternative B are compared to the existing condition to assess the effects of the project on a species habitat. Again, this analysis occurs in 2 scales, the project scale and cumulative-effects scales.

METHODS

The methods used to assess the impacts to each species are discussed under Methods and under the specific species (if additional methods were used) in Chapter III.

COARSE-FILTER ASSESSMENT

Age Class

- ***No-Action Alternative A***

  The amount of acres in each age class would remain relatively constant. In time, the higher age classes and stocking density of shade-tolerant tree species would increase at the expense of lower age classes, lower stocking densities, and shade-intolerant tree species. These habitat conditions would retain habitat for red-backed voles.

- ***Action Alternative B***

  Under Action Alternative B, 190 acres would be converted to the youngest age class (0-to-39 years) from older age classes, which would benefit species, such as bluebirds, that use open habitats. In the harvested stands, many of the structural components (snags, coarse woody debris) would be retained, thereby only affecting tree species composition and forest cover habitat components.

Cover Type

- ***No-Action Alternative A***

  Shade-tolerant cover types would increase at the expense of shade-intolerant cover types. This situation would benefit species that require shade-tolerant tree species and closed canopy for all or part of their habitats.

- ***Action Alternative B***

  Approximately 648 acres would be converted from a shade-tolerant to a shade-intolerant cover type. Species for whom alpine fir and mixed conifer habitats play an important function would be negatively affected approximately proportional to the reduction in acreage realized. Conversely, species for whom western larch and/or Douglas-fir habitats play an important role would benefit in a proportion similar to the harvest units. Forest cover classes would be moved toward historic conditions, benefiting species that require open forest canopies and shade-intolerant tree species.

Old Growth

- ***No-Action Alternative A***

  Old-growth habitats would remain unchanged in amount and structure in the short term.

- ***Action Alternative B***

  Old growth would be reduced by 55 acres. In the harvested area, live large shade-intolerant trees, snags, and downed woody material would be retained. The reduction in old growth would affect species that rely on an old-growth structure with closed canopies. Species that use structural components of old growth in open canopies would benefit by the increase of 55 acres of habitat. Additionally, harvesting would result in regenerating shade-intolerant species to provide habitat in the distant future.

THREATENED AND ENDANGERED SPECIES

BALD EAGLE

Direct and Indirect Effects

- ***No-Action Alternative A***

  Human disturbance would continue at approximately the same rate. No timber harvesting would occur in any of the management areas. In the eastern portion of Unit 10, tree growth would continue at a reduced rate due to the high stocking level. Additionally, emergent trees that are used for perches would slowly develop as some trees exhibit dominance in the stand. The visual screening provided by lodgepole pine would be retained.

- ***Action Alternative B***

  Harvesting operations may disturb eagles nesting in the area, resulting in the eagles leaving the nest for longer periods of time (increasing risk to nest predation, failed egg hatching, and/or eaglet mortality) and/or abandoning the nest. Zubik (1988) did not observe "apparent adverse reactions" to regular logging truck traffic. During past harvesting activities, loggers within 600 feet of the nest elicited an adverse reaction from the nesting bald eagles. Portions of Unit 14 and 15 are over 600 feet from the nest; therefore, whether logging activities in these units would disturb the nesting birds is uncertain. To ensure nesting security, harvesting activities in these units are recommended to occur outside the nesting season (February 1 through July 31). Harvesting in other areas are less likely to appreciably affect bald eagles.

Under this alternative, bald eagle habitat would be modified; however, no changes would occur in the nest area. However, the proposed road closures, if effective, would limit human disturbance and firewood cutting on the roads one-eighth mile to the north and south of the nest, resulting in decreased disturbance to nesting bald eagles. This benefit may be short-lived if the nest tree falls over and the eagles renest outside the designated nest area.

In the primary use area, approximately 15 acres of Unit 10 would be modified, with approximately 500 lineal feet on Stillwater River. In the site-specific plan, a 200-foot buffer along Lower Stillwater Lake and Stillwater River will be implemented to protect perching habitat. Due to the small tree size, the existing stand does not contain or promote development of suitable perch sites. Under Action Alternative B, western larch trees would be left and released, while lodgepole pine would be removed. The removal of lodgepole pine would reduce visual screening. Based on the above discussion, harvesting within Unit 10 and outside of the 200-foot buffer is expected to improve future habitat by releasing western larch to provide emergent trees; few immediate impacts are expected. The 200-foot buffer will be used to protect the connectivity of forested cover along Stillwater River.

Cumulative Effects

- ***No-Action Alternative A***

  Unit 11 would not be harvested in the home range area. The existing snags, large live trees, and visual screening would be retained. The existing road network would remain unchanged, allowing:

  - easy access of human use to the west side of the lake and
  - the potential for snag reduction by firewood cutters.

- ***Action Alternative B***

  Several harvest units in the home range area would be harvested. Only changes in Unit 11 are expected to potentially alter eagle habitat appreciably. The prescription for this unit would result in decreased visual screening while retaining large snags and other perch sites. The removal of visual screening is not expected to result in detrimental impacts, because the eagle-use-area pothole (isolated wetland) is approximately one-quarter mile away from the main road and would be screened from the road by the canopy of the leave trees. The proposed commercial thin treatment for Unit 11 would retain cover for prey species in the area. This unit is outside of the 100-foot SMZ.

CANADA LYNX

The project area is not expected to support lynx due to the low elevation (less than 3,400 feet). However, since snowshoe hares use the project area, a slight chance that lynx forage in the area is possible, but improbable.

Direct and Indirect Effects

- ***No-Action Alternative A***

  Timber stands would remain unharvested. Over time, the lower branches that provide snowshoe hare cover would extend higher above the snow, thereby reducing snowshoe hare cover. The reduction of cover would result in decreased hare use of the project area, resulting in reduced lynx prey. In some cases, limited cover would be retained in isolated, small pockets near thickets and conifers such as spruce and subalpine fir.

- ***Action Alternative B***

  Areas of high hare use would be avoided, mainly due to the size class of the trees (0 to 39 years). These areas are expected to decline in quality through time. Some hare use was documented in the proposed units. The proposed treatments would increase the amount of habitat in a mosaic pattern in the 0-to-39-year age class with lighter tree removal. This situation would provide snowshoe hare habitat in the future, while maintaining forested cover for lynx to move through. Harvesting old growth is not expected to remove denning habitat.

Cumulative Effects

- ***Common to Alternatives A and B***

  Under either alternative, denning habitat in the general area would not be altered by this project.

- ***No-Action Alternative A***

  Canada lynx foraging habitat is expected to decline through time.

- ***Action Alternative B***

  The harvests planned for the Good Creek area may increase lynx foraging habitat in areas better suited for lynx. Under Action Alternative B, lynx foraging habitat in the area may be developed, while losses of foraging habitat may occur in time. This would be additive to the development of foraging habitat realized in the Good Creek area.

GRIZZLY BEAR

Direct and Indirect Effects

- ***No-Action Alternative A***

  Under No-Action Alternative A, increased disturbance to grizzly bears would not occur.

- ***Action Alternative B***

  This project may affect grizzly bears directly through increased road traffic, noise, and human activity and indirectly by altering the amount of hiding cover and forage resources. Activities in occupied grizzly bear habitat reduce grizzly bear security, possibly resulting in increased stress and/or energy expenditure to endure the disturbance or to move from the area. These disturbances would only be present during the harvesting operations in Units 5 through 8 if these units are harvested in the spring.

  The season of disturbance is important in addressing impacts to grizzly bears.. Winter harvesting would result in no direct effects to bears. Secondarily, activities that target time periods when the probability of animals using the area is low would result in reduced direct disturbance to grizzly bears in the nondenning period. Under this alternative, harvesting Units 5 through 8, which occur in spring habitat, after July 1 would minimize disturbance to grizzly bears.

  Timber harvesting would reduce hiding cover, especially in seedtree units. Hiding cover is especially important along open roads and in areas that receive human disturbance. Under Action Alternative B, harvesting timber in Units 5 through 8 would reduce grizzly bear hiding cover by 597 acres. Some pockets of cover would be maintained within the units; therefore, these figures represent a liberal estimate of the potential loss of hiding cover in the project area. Forested buffers of 75 to 100 feet would be retained between units and open roads, railroad tracks, wetlands, and riparian bottoms to provide screening to facilitate grizzly bear travel; enough cover should be retained to visually block observation. Protecting regeneration during harvesting would add to the amount of hiding cover left in the area and is recommended near feeding sites and along open roads. Hiding cover in the harvested units is expected to regenerate in approximately 25 years.

Timber harvesting may reduce habitat quality within the proposed units. The effects of timber harvesting on bear habitat are not conclusive. *Waller and Mace (1997)* found cutting units were avoided in spring and autumn, but were among the most preferred habitats in the summer within the bears home range. Also, they noted that clearcuts were used less than other types of harvesting. *Waller (1992)* suggested that human disturbance and hiding cover may be important factors to explain the decreased use of harvested areas. The proposed harvesting is planned to occur in spring habitat. Harvesting in Units 5, 6, and 8 (362 acres) is expected to decrease the value of the available spring habitat in the project area. The mitigation discussed above for retaining hiding cover, along with closing the roads accessing Units 5 and 8, may offset, to some degree, the impacts to bears. Conversely, the open road across the northeast portion of Unit 6 may increase the amount of time needed before bears start to use the stand heavily. The commercial-thin harvest planned in Unit 7 is expected to produce less effects than the modified seedtree harvest in the other units. Additionally, the temporary road that would be built to access the unit would be obliterated after use, thereby reestablishing the security of the area.

Cumulative Effects

- ***No-Action Alternative A***

Motorized access to the area would remain unchanged. Forest succession would continue and may reduce food sources for grizzly bears, but increase the amount of hiding cover.

- ***Action Alternative B***

Several restricted/closed roads would be opened and several temporary roads would be built *(see Figure II-1)*. The proposed road changes open a large road network. However, the road would be used only for activities related to the harvesting; log decks, heavy equipment, etc., would be placed to prevent other motorized use. On gated roads, the gates would be opened and the roads would be signed to prevent public access during active logging. When logging is not active, the gate would be locked. To prevent disturbance to wildlife, a log deck, logs, or heavy equipment would be used to block the road at the end of the harvest unit.

These changes in road management would increase the POR and PTR exceeding the specified density standards for Lazy Creek Subunit and State trust lands in the subunit by 1%. Upon completion, the roads used would be returned to their condition prior to this project; therefore, POR and PTR for the subunit and State lands within the subunits would revert to the preexisting condition. The road-density parameters before, during, and after the Good/Long/Boyle Project are within the SFLMP guidance *(Table IV-7)*. The increases in POR and PTR due to this project may reduce grizzly bear habitat and/or increase disturbance to grizzly bears. As stated in Chapter III, the value of the project area is mainly for spring use.

This project in combination with other projects in the area would further reduce hiding cover. Considering this project in addition to the other projects occurring in this subunit, approximately 81% of State trust lands would remain in hiding cover. Since the range is above 40% and hiding cover is retained along open roads and feeding sites, the additional loss of hiding cover is not expected to appreciably affect grizzly bears in the subunit.

TABLE IV-7 - ROAD DENSITIES SET AS BASELINE LEVELS IN 1996 COMPARED WITH ROAD DENSITY LEVELS BEFORE, DURING, AND AFTER THE GOOD/LONG/BOYLE (GLB) PROJECT

ANALYSIS UNIT	STATUS	BASELINE LEVELS 2/96	EXISTING LEVELS 3/2000	DURING GLB PROJECT	AFTER COMPLETION OF GLB PROJECT
Lazy Creek Subunit	Open road density (less than 1 mile per square mile)	50%	46%	47%	46%
	Total road density (less than 2 miles per square mile)	74%	71%	72%	71%
State lands within Lazy Creek Subunit	Open road density (less than 1 mile per square mile)	76%	69%	70%	69%
	Total road density (less than 2 miles per square mile)	76%	73%	74%	73%

TABLE IV-8 - AMOUNT OF HIDING COVER TO BE REMOVED FROM DNRC OWNERSHIP IN THE LAZY CREEK SUBUNIT

	HIDING COVER	STATUS
Existing Condition	13,393	Existing
Chicken/Werner	-1,261	Sold
Taylor South	-626	Alternative development (the highest removal alternative)
Good/Long/Boyle	-597	EA document and alternative selection
Future Condition (% DNRC land in hiding cover)	10,909	

NORTHERN ROCKY MOUNTAIN WOLF

Direct and Indirect Effects

- ***No-Action Alternative A***

  Disturbance to wolves would not increase. Forest canopy closure would continue to decrease big game forage, while providing thermal cover in the area. In the short term, white-tailed deer habitat would increase as thermal cover is reestablished, thereby enhancing big game use of the area and increasing wolf prey in the area. However, the high road densities and human disturbance in the area would continue to limit wolf use in the area.

- ***Action Alternative B***

  If wolves were using the area, they may be disturbed by harvesting activities. Although not expected, if an active wolf den or rendezvous site is documented in the project area or within 1 mile, informal consultation with USFWS would be immediately initiated. The harvest units are expected to increase forage and decrease summer thermal cover for white-tailed deer species during the nonwinter period. This effect could result in reduced white-tailed deer use, thereby decreasing wolf prey in the area. Again, the high road densities and human disturbance in the area would continue to limit wolf use in the area. The planned road closures would increase secure habitat; however, the increase would be slight and not expected to enhance habitat security appreciably.

Cumulative Effects

- ***No-Action Alternative A***

  Under this alternative, white-tailed deer use, in time, may shift toward the project area as old harvest units regenerate. Therefore, the effects to wolves are expected to be minor.

- ***Action Alternative B***

  Since the expected effects of this project on wolves would be minor, cumulative effects also would be minor. Some slight shifts of big game use may occur. White-tailed deer use may decrease in the project area due to the removal of cover and elk use may decrease due to the reduced hiding cover. Any shifts are expected to be minimal. Travel corridors along riparian areas would be retained throughout the project area, thereby maintaining connectivity to surrounding habitats. Again, due to the high road densities, wolf use of the area is not expected.

SENSITIVE SPECIES

FISHER

Direct and Indirect Effects

- ***No-Action Alternative A***

  No modification in fisher habitat would occur.

- ***Action Alternative B***

  Only portions of Unit 12 are in potential fisher habitat. However, a 165-foot buffer along the stream would not be harvested. This buffer would maintain a forested movement corridor for fishers along with retaining some resting habitat of lower quality. In the areas around Good Creek, many adjacent stands were harvested, thereby increasing the diversity of mainly young seral stages in the project area. These areas may provide foraging habitat. Road access to Good Creek would not be changed after implementation of the project; therefore, fisher vulnerability to trapping would remain unchanged.

Cumulative Effects

In the Good Creek Resource Management Project proposed by the USDA Forest Service, Alternative F was selected for implementation. Under Alternative B of the Good/Long/Boyle Timber Sale Project, approximately 167 acres of potential fisher habitat would be logged; however, no harvesting would occur within 300 feet of streams. The proposed harvest treatments would retain movement corridors along Good Creek, while not decreasing quality resting habitat. Therefore, discussion under the direct and indirect effects to fisher also hold true for the cumulative effects analysis area.

HARLEQUIN DUCKS

Direct and Indirect Effects

- ***No-Action Alternative A***

  The habitat for harlequin ducks would not be altered. Road conditions would continue to deposit sediment to the stream.

- ***Action Alternative B***

  Several roads that may be adding sediment to streams would be improved, resulting in reduced sediment production and a slight improvement in water quality. No harvesting would occur along the streambank; therefore, cover would be retained to provide shade and cover for harlequins. Under either alternative, the effects to harlequin ducks would be miniscule.

Cumulative Effects

USFS harvests upstream of the project area may increase streambank erosion in some drainages. However, water quality downstream on Good Creek is not expected to change. Since the upstream project does not appreciably alter the existing conditions for the project area, the direct and indirect effects discussions are also true for the cumulative-effects analysis area.

PILEATED WOODPECKERS

Direct and Indirect Effects

- ***No-Action Alternative A***

  Trees would continue to grow in diameter and die, thus, providing pileated woodpecker habitat. However, barring any disturbance, as these trees die out, replacement trees (shade-intolerant) would not be present, barring any disturbance. Therefore, under the No-Action Alternative, pileated woodpecker habitat would increase through time, then decline.

- ***Action Alternative B***

  Out of 1,564 acres of pileated woodpecker nesting habitat, approximately 313 acres would be entered. The 77 acres of pileated woodpecker nesting habitat in Unit 6 would be treated to produce a modified shelterwood/seedtree with reserves. In Unit 7, approximately 236 acres of pileated woodpecker habitat would be commercially thinned. These treatments are expected to reduce quality nesting habitat by removing midstory cover, while retaining snags and snag recruits (nesting structure). Both Units 6 and 7 are part of a large block of nesting habitat. The proposed harvests would leave existing snags and hardwoods, while removing the smaller, less-dominant trees, resulting in the retention of pileated woodpecker feeding habitat. The nesting structure in snags and snag recruits would be retained, but quality nesting habitat in both units may decline due to the loss of the overstory and/or midstory canopy cover. In seedtree areas, the resulting open canopy would allow for natural regeneration and growth of replacement shade-intolerant tree species to provide nesting structure in the distant future.

Cumulative Effects

Since the project area is large enough to encompass several home ranges of pileated woodpeckers, the cumulative-effects analysis area is the project area. The direct and indirect effects discussions are also true for the cumulative-effects analysis.

BIG GAME

Direct and Indirect Effects

- ***No-Action Alternative A***

  Thermal and hiding cover are expected to be retained and increase over time.

  White-tailed deer habitat is expected to increase as hiding and thermal cover increase. However, increases in cover may decrease elk habitat over time by reducing herbaceous forage. As the existing units age, moose habitat is expected to decline. The existing hiding cover would be retained, thereby providing some security for big game during hunting season. The road densities would remain high, thereby decreasing elk habitat effectiveness and security in the project area.

- ***Action Alternative B***

  Thermal and hiding cover would be removed from the project area. In the Lupfer area, harvesting would remove 362, 236, and 598 acres of winter thermal cover, summer thermal cover, and hiding cover, respectively. In the Martin Camp area, harvesting would remove 143, 150, and 541 acres of winter thermal cover, summer thermal cover, and hiding cover, respectively *(Table IV-9)*.

  White-tailed deer habitat in the Martin Camp area would be modified by reducing hiding cover by 541 acres and summer thermal cover by 293 acres. These harvest units are scattered throughout the area and are irregularly shaped. The irregular shape would increase edge habitat, which is heavily used by white-tailed deer. Areas near riparian areas are especially important to white-tailed deer. Units 1, 2, 3, 4, 10, 11, 12, and 13 are adjacent to riparian habitat. Clearcut and seedtree harvests planned in Units 2, 3, 4, and 10 would remove habitat in these units. Shelterwood, commercial thin, and improvement harvests would maintain enough cover to retain some habitat value for white-tailed deer. Units 1, 2, 3, 4, 12, and 13 lie within the migration corridor. The harvests planned would result in a decrease of habitat in the migration corridor; however, the

TABLE IV-9 - ACRES OF THERMAL AND HIDING COVER BY THE AREA FOLLOWING IMPLEMENTATION OF THE ACTION ALTERNATIVE

AREA	WINTER THERMAL		SUMMER THERMAL		HIDING COVER	
	NO ACTION	ACTION	NO ACTION	ACTION	NO ACTION	ACTION
Lupfer portion	1,116	754	398	162	1,896	1,298
Martin Camp portion	812	669	725	575	3,889	3,348
Project area	1,928	1,423	1,123	737	5,785	4,646

connectivity of the corridor would be retained.

Under Action Alternative B, elk habitat would be reduced in the Lupfer area. The area is presently fragmented and consists of a high road density. Presently, many historic harvest units are providing hiding cover, or will in the near future. The proposed harvesting would remove hiding cover, thereby decreasing habitat security for elk during the hunting season. Forested travel corridors would allow for movement into and out of the project area. No changes in road densities are planned; therefore, habitat effectiveness and security would remain low in the area.

The regeneration harvests would promote production of browse and young conifers. These changes would increase forage for wintering moose. Additionally, many of the proposed units are irregularly shaped and interspersed with thermal cover. However, the reduction in thermal cover may reduce the quality of winter habitat in years when snow accumulation is high. In mild winters, the effects of the reduced thermal cover are expected to be minimal.

To reduce the impacts to big game, buffers around meadows, open roads, and wetlands would be retained. These buffers need to be wide enough to provide a visual block from the buffered structure into the stand. Additionally, harvesting techniques employed would result in a patchy unit with clumps of habitat retained.

Cumulative Effects for Big Game

- ***No-Action Alternative A***

White-tailed deer migration and summer habitat in the area would not be changed. Over time, as canopy cover increases in the area, summer thermal cover would increase, thereby increasing summer habitat, especially near riparian areas.

Elk hiding cover and travel corridors would be retained. In the future, hiding cover and connectivity would continue to increase. With increased canopy cover, forage resources would decline through time. The existing road densities would be constant.

Through time, moose habitat would decrease on State lands, but timber harvesting on neighboring properties would provide forage opportunities.

- ***Action Alternative B***

White-tailed deer migration corridors would be retained; however, some units would decrease available habitat along the migration route. Summer habitat would be decreased by the removal of thermal cover around riparian areas. These habitat changes may result in decreased deer use in the Martin Camp area. Since summer habitat is not limiting and the migration corridor is not severed, the effects to white-tailed deer are expected to be shifted away from the project area into other available summer ranges. This shift would be maintained until summer thermal and hiding cover is reestablished in the project area. Habitat shifts to other areas is not expected to change the carrying capacity of the hunting district; however, hunter success rates may shift accordingly with the changes in habitat use.

Elk habitat would be modified. Providing a buffer along the temporary stream that runs through Unit 5 would retain travel corridors into the project area from the north. Since most of the project area is within one-half mile of an open road, effective elk habitat is limited. The removal of cover in the area is expected to result in a shift of elk away from the project area until hiding cover is reestablished. More secure habitat exists on Plum Creek lands to the east; however, most of this land is in an early seral stage due to timber harvesting. Since summer habitat is not limiting, the carrying capacity of the hunting district is not expected to change. Habitat shifts to other areas is not expected to change the carrying capacity of the hunting district; however, hunter success rates may shift accordingly with the changes in habitat use.

Moose habitat is expected to increase. The increased forage intermixed with thermal cover may cause a slight shift of moose into the project area. Neighboring lands are experiencing similar conditions. Timber harvesting in the general area would continue to provide forage at the expense of thermal cover. However, as existing harvest units age, the amount of moose habitat is expected to decrease in the area.

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GLOSSARY

Administrative road use
Road use that is restricted to DNRC personnel and contractors or for purposes such as monitoring, forest improvement, fire control, hazard reduction, etc.

Airshed
An area defined by a certain set of air conditions; typically a mountain valley in which air movement is constrained by natural conditions such as topography.

Appropriate conditions
Describes the set of forest conditions determined by DNRC to best meet the State Forest Land Management Plan (SFLMP) objectives. The four main components useful for describing an appropriate mix of conditions are cover type proportions, age class distributions, stand structural characteristics, and the spatial relationships of stands (size, shape, location, etc.), all assessed across the landscape.

Basal area
A measure of the number of square feet of space occupied by the stem of a tree.

Best Management Practices (BMPs)
Guidelines to direct forest activities, such as logging and road construction, for the protection of soils and water quality.

Biodiversity
The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur.

Board foot
144 cubic inches of wood that is equivalent to a piece of lumber 1-inch thick by 1-foot wide by 1-foot long.

Boreal forest
The type of forest found in the Northern Temperate Zones and Arctic region.

Canopy
The upper level of a forest, consisting of branches and leaves of taller trees.

Cavity
A hollow excavated in trees by birds or other animals. Cavities are used for roosting and reproduction by many birds and mammals.

Compaction
Increase in soil density caused by force exerted at the soil surface, modifying aeration and nutrient availability.

Connectivity
The quality, extent, or state of being joined; unity; the opposite of fragmentation.

Core area
See Security Habitat (grizzly bears).

Cover
See HIDING COVER and/or THERMAL COVER.

Co-dominant tree
A tree which extends its crown into the canopy, receiving direct sunlight from above and limited sunlight on its sides. One or more sides are crowded by the crowns of other trees.

Coarse down woody material
Dead trees within a forest stand that have fallen and begun decomposing on the forest floor.

Crown cover or crown closure
The percentage of a given area covered by the crowns of trees.

Cutting units
Areas of timber proposed for harvest.

Cull
A tree of such poor quality that it has no merchantable value in terms of the product being cut.

Discounting
In economics, a method of accounting for the value of money over time, its ability to earn interest, so that costs and benefits occurring at different points in time are brought to a common date for comparison.

Ditch relief
A method of draining water from roads using ditches and a corrugated metal pipe. The pipe is placed just under the road surface.

Dominant tree
Those trees within a forest stand that extend their crowns above surrounding trees and capture sunlight from above and around the crown.

Drain dip
A graded depression built into a road to divert water and prevent soil erosion.

Ecosystem
An interacting system of living organisms and the land and water that make up their environment; the home place of all living things, including humans.

Environmental effects
The impacts or effects of a project on the natural and human environment.

Equivalent clearcut area (ECA)
The total area within a watershed where timber has been harvested, including clearcuts, partial cuts, roads, and burns.

> *Allowable ECA* - The estimated number of acres that can be clearcut before stream channel stability is affected.
>
> *Existing ECA* - The number of acres that have been previously harvested taking into account the degree of hydrologic recovery that has occurred due to revegetation.
>
> *Remaining ECA* -The calculated amount of harvest that may occur without substantially increasing the risk of causing detrimental effects to stream-channel stability.

Excavator piling
The piling of logging residue using an excavator.

Face drainages
A direct tributary for a watershed that may or may not meet the definition of a perennial stream; a first order drainage.

Fire regimes
Describes the frequency, type, and severity of wildfires. Examples include: frequent, nonlethal underburns; mixed-severity fires; and stand-replacement or lethal burns.

Floristic
Pertaining to flowers or plants of a particular region or period, listed by species and considered as a whole.

Forage
All browse and nonwoody plants available to wildlife for grazing.

Forest improvement
The establishment and growing of trees after a site has been harvested. Associated activities include site preparation, planting, survival checks, regeneration surveys, and stand thinnings; road maintenance; resource monitoring; noxious weed management; and right of way acquisition on a State Forest.

Fragmentation (forest)
A reduction of connectivity and increase in sharp stand edges resulting when large contiguous areas of forest with similar age and structural character are interrupted through disturbance (e.g., stand-replacement fire, timber harvesting).

Habitat
The place where a plant or animal naturally or normally lives and grows.

Habitat type
The place or type of site where a plant or animal naturally or normally lives and grows.

Hazard reduction
The abatement of a fire hazard by processing logging residue with methods such as separation, removal, scattering, lopping, crushing, piling and burning, broadcast burning, burying, and chipping.

Hiding cover
Vegetation capable of hiding some specified portion of a standing adult mammal from human view at a distance of 200 feet.

Historical forest condition
The condition of the forest prior to settlement by Europeans.

Intermediate trees
A characteristics of certain tree species which allows them to survive in relatively low light conditions, although they may not thrive.

Interdisciplinary team
A team of resource specialists brought together to analyze the effects of a project on the environment.

Landscape
An area of land with interacting ecosystems.

Mitigation measure
An action or policy designed to reduce or prevent detrimental effects.

Moving-window analysis
A computer-based method that, in this EIS, is used to quantify the area influenced by roads in a study area. Starting with the pixel in the upper left corner of the computerized subunit map, the computer calculates how many miles of road exist within a 1-square-mile "window" around that pixel. It moves to the next pixel and repeats the process until the road density is calculated in a 1-square-mile area around every pixel in the study area. The number and percentage of pixels in the study area that fall into different road density classes are then calculated by the computer. Based on research studying the effects of roads on grizzly bears, the effects of open roads are measured by the percentage of the pixels in the study area that have at least 1.0 mile of open road in the surrounding 1-square-mile window. The effects of total roads (open, gated, barricaded, bermed, but not brushed, etc.) are measured by the percentage of pixels in the study area that have at least 2 miles of open or restricted roads in the surrounding 1-square-mile window.

Multistoried stands
Timber stands with two or more distinct stories.

Nest site area (bald eagle)
The area in which human activity or development may stimulate abandonment of the breeding area, affect successful completion of the nesting cycle, or reduce productivity. It is either mapped for a specific nest, based on field data, or, if that is impossible, is defined as the area within a ¼-mile radius of all nest sites in the breeding area that have been active within 5 years.

No-action alternative
The option of maintaining the status quo and continuing present management activities and/or not implementing the proposed project.

Nonforested area
A naturally occurring area where trees do not establish over the long term, such as a bog, natural meadow, avalanche chute, and alpine areas.

Old growth
Working definition - Old growth is defined by DNRC as stands that are 150 years and older (140 for

lodgepole pine) and that exhibit a range of structural attributes associated with old age.

Conceptual definition - The term old growth is sometimes used to describe the later, or older, stages of natural development of forest stands. Characteristics associated with old-growth generally include relatively large old trees, containing a wide variation in tree sizes, exhibiting some degree of a multi-storied structure, having signs of decadence, such as rot and spike-topped structure, and containing standing large snags and large down logs.

Overstory
The level of the forest canopy including the crowns of dominant, codominant and intermediate trees.

Patch
A discrete area of forest connected to other discrete forest areas by relatively narrow corridors; an ecosystem element (such as vegetation) that is relatively homogeneous internally, but differs from what surrounds it.

Patch shape index
A system for assessing patch shape, or a number indicating this shape. The system used in this EIS was developed by McGarigal and Marks (1994). Under this system, a perfectly square patch is represented by the number 1. Circular patches are indicated with numbers less than one. The higher the number, the more complex the shape.

Potential nesting habitat (bald eagle)
Sometimes referred to as 'suitable nesting habitat', areas that have no history of occupancy by breeding bald eagles, but contain potential to do so.

Project file
A public record of the analysis process, including all documents that form the basis for the project analysis. The project file for the Beaver Lake Timber Sale Project EIS is located at the Stillwater State Forest office near Olney, Montana.

Redds
The spawning ground or nest of various fish species.

Regeneration
The replacement of one forest stand by another as a result of natural seeding, sprouting, planting, or other methods.

Residual stand
Trees that remain standing following any cutting operation.

Road construction activities
In general, "road construction activities" refers to all the activities conducted while building new roads, reconstructing existing roads, and obliterating roads. These activities may include any or all of the following:

- road construction
- right-of-way clearing
- excavation of cut/fill material
- installation of road surface and ditch drainage features
- installation of culverts at stream crossings
- burning right-of-way slash
- hauling and installation of borrow material
- blading and shaping road surfaces

Road Improvements
Construction projects on an existing road to improve ease of travel, safety, drainage, and water quality.

Saplings
Trees 1.0 inches to 4.0 inches in diameter at breast height.

Sawtimber trees
Trees with a minimum dbh of 9 inches.

Scarification
The mechanized gouging and ripping of surface vegetation and litter to expose mineral soil and enhance the establishment of natural regeneration.

Scoping
The process of determining the extent of the environmental assessment task. Scoping includes public involvement to learn which issues and concerns should be addressed, and the depth of assessment that will be required. It also includes a review of other factors such as laws, policies, actions by other landowners, and jurisdictions of other agencies that may affect the extent of assessment needed.

Security
For wild animals, the freedom from the likelihood of displacement or mortality due to human disturbance or confrontation.

Security habitat (grizzly bears)
An area of a minimum of 2,500 acres that is at least 0.3 miles from trails or roads with motorized travel and high-intensity, nonmotorized use during the nondenning period.

Seedlings
Live trees less than 1.0 inch dbh.

Sediment
In bodies of water, solid material, mineral or organic, that is suspended and transported or deposited.

Sediment yield
The amount of sediment that is carried to streams.

Seral
Refers to a biotic community that is in a developmental, transitional stage in ecological succession.

Shade intolerant
Describes tree species that generally can only reproduce and grow in the open or where the overstory is broken and allows sufficient sunlight to penetrate. Often these are seral species that get replaced by more shade-tolerant species during succession. In Stillwater State State Forest, shade-intolerant species generally include ponderosa pine, western larch, Douglas-fir, western white pine, and lodgepole pine.

Shade tolerant
Describes tree species that can reproduce and grow under the canopy in poor sunlight conditions. These species replace less shade-tolerant species during succession. In Stillwater State Forest, shade-tolerant species generally include subalpine fir, grand fir, Douglas-fir, Engelmann spruce, and western red cedar.

Sight distance
In the case of grizzly bears, sight distance refers to the distance at which 90 percent of a bear is hidden from view.

Silviculture
The art and science of managing the establishment, composition, and growth of forests to accomplish specific objectives.

Site Preparation
A hand or mechanized manipulation of a harvested site to enhance the success of regeneration. Treatments are intended to modify the soil, litter, and vegetation to create microclimate conditions conducive to the establishment and growth of desired species.

Slash
Branches, tops, and cull trees left on the ground following a harvest.

Snag
A standing dead tree or the portion of a broken off tree. Snags may provide feeding and/or nesting sites for wildlife.

Snow intercept
The action of trees and other plants in catching falling snow and preventing it from reaching the ground.

Spur roads
Low standard roads, constructed to meet minimum requirements for harvest-related traffic.

Stand
An aggregation of trees occupying a specific area and sufficiently uniform in composition, age arrangement, and condition so to be distinguishable from the adjoining forest.

Stand density
Number of trees per acre.

Stocking
The degree of occupancy of land by trees as measured by basal area or number of trees and as compared to a stocking standard, which is an estimate of either the basal area or number of trees per acre required to fully use the growth potential of the land.

Stream gradient
The slope of a stream along its course, usually expressed in percentage indicating the amount of drop per 100 feet.

Stumpage
The value of standing trees in the forest. Sometimes used to mean the commercial value of standing trees.

Substrate scoring
Rating of streambed particle sizes.

Succession
The natural series of replacement of one plant (and animal) community by another over time in the absence of disturbance.

Suppressed
The condition of a tree characterized by a low-growth rate and low vigor due to competition with overtopping trees.

Texture
A term used in visual assessments indicating distinctive or identifying features of the landscape depending on distance.

Thermal cover
For white-tailed deer, thermal cover has 70% or more coniferous canopy closure at least 20 feet above the ground, generally requiring trees to be 40 feet or taller.

For elk and mule deer, thermal cover has 50% or more coniferous canopy closure at least 20 feet above the ground, generally requiring trees to be 40 feet or taller.

Timber-harvesting activities
In general, timber-harvesting activities refers to all the activities conducted to facilitate timber removal before, during, and after the timber is removed. These activities may include any or all of the following:

- felling standing trees and bucking into logs
- skidding logs to a landing
- processing, sorting, and loading logs at the landing
- hauling logs to a mill
- slashing and sanitizing residual vegetation damaged during logging
- machine piling logging slash
- burning logging slash
- scarification, site preparation
- planting trees

Transaction Evidence Equation
Multivariant regression based on past sales and market variables.

Understory
The trees and other woody species growing under a, more-or-less, continuous cover of branches and foliage formed collectively by the overstory of adjacent trees and other woody growth.

Uneven-aged stand
Various ages and sizes of trees growing together on a uniform site.

Ungulates
Hoofed mammals, such as mule deer, white-tailed deer, elk, moose, which are mostly herbivorous and many are horned or antlered.

Vigor
The degree of health and growth of a tree or stand.

Watershed
The region or area drained by a river or other body of water.

Ungulates
Hoofed mammals, such as mule deer, white-tailed deer, elk, moose, which are mostly herbivorous and many are horned or antlered.

Vigor
The degree of health and growth of a tree or stand.

Watershed
The region or area drained by a river or other body of water.

Water yield
The average annual runoff for a particular watershed expressed in acre-feet.

Water yield increase
An increase in average annual runoff over natural conditions due to forest canopy removal.

Windthrow
A tree pushed over by wind. Windthrows (blowdowns) are common among shallow rooted species and in areas where cutting or natural disturbances have reduced the density of a stand so individual trees remain unprotected from the force of the wind.

APPENDIX A

STIPULATIONS AND SPECIFICATIONS

The stipulations and specifications for the action alternatives were designed to prevent or reduce potential effects to resources considered in this analysis. In part, stipulations and specifications are a direct result of issue identification and resource concerns. This section is organized by resource.

Stipulations and specifications that apply to operations required by and occurring during the contract period will be contained within the Timber Sale Contract. As such, they are binding and enforceable. Stipulations and specifications relating to activities, such as hazard reduction, site preparation, and planting, that may occur during or after the contract period will be enforced by project administrators.

The following stipulations and specifications are incorporated to mitigate effects on resources involved with the action alternatives considered in this proposal.

WATERSHED AND FISHERIES

- Planned erosion-control measures include graveling portions of roads, constructing slash-filter windrows, and planting grass seed. Details for these control measures will be included in Appendix B of the Timber Sale Agreement.
- SMZs will be delineated where they occur in harvest areas to maintain water quality and protect areas adjacent to streams.
- Isolated wetlands will be protected with equipment-restriction buffers of a minimum of 50 feet.
- Culvert sizing for all road projects will be as recommended by the DNRC hydrologist.
- Stream crossings, where culvert replacements are necessary, will have the following requirements, as needed, to meet BMPs and protect water quality:
    - Slash-filter windrows will be constructed on the approach fills.
    - Filter-fabric fences will be in place downstream prior to and during culvert installation.
    - Diversion channels will be constructed and lined with plastic to divert streamflow prior to any in-channel operations.
    - Except for the equipment used to construct a stream crossing, equipment in streams is prohibited. Equipment used for constructing the crossing will be limited to no more than 2 crossings.
- Brush will be removed from existing road prisms to allow effective road maintenance. Improved road maintenance will reduce sediment delivery.
- The contractor will be responsible for the immediate cleanup of any spills (fuel, oil, dirt, etc.) that will affect water quality.
- Fuel-leaking equipment will not be permitted to operate in stream-crossing construction sites.
- Included in the project proposal are pertinent recommendations of the Flathead Basin Forest Practices, Water Quality and Fisheries Cooperative Program Final Report.

The following numbers correspond to the numbering of recommendation items contained within the aforementioned document, included in pages 154 through 162 of the final report:

1) BMPs are incorporated into the project design and operations of the proposed project.

2) Riparian indicators will be considered in the harvest unit layout.

3) Management standards of the SMZ Law (75-5-301, MCA) are used in conjunction with the recommendations of the study.

4) The BMP audit process will continue. This sale will likely be reviewed in an internal audit and may be picked at random as a Statewide audit site.

7) SMZs will be evaluated as a part of the audit process.

12) Watershed-level planning and analysis are complete. Logging plans of USFS, as reported to the Cumulative Watershed Effects Cooperative, are used.

15) DNRC will use the best methods available for logging and road building for this proposal.

17) DNRC requested inventory information from DFWP. DNRC's mitigation plan for roads fits all recommendations for "impaired streams". Using "worst-case-scenario" criteria provides for conservative operations in this proposal.

18) Provisions in the Timber Sale Agreement address BMPs that are rigidly enforced.

29-34) DNRC has cooperated with DFWP for continuing fisheries work. DNRC will continue to monitor fisheries in the future as funding allows.

GRIZZLY BEARS

The following items are incorporated into this proposal:

- Contractors will be required to haul or store garbage in a safe place so bears will not be attracted to the area.
- To minimize effects to grizzly bears in spring habitat, no harvesting will occur between April 1 and July 1 in Units 5, 6, 7, and 8.
- No logging camps would be allowed in the sale area unless approved by the Forest Officer.
- The Forest Officer will immediately suspend any or all activities directly related to the proposed action, if necessary, to prevent imminent confrontation or conflict between grizzly bears and humans or other threatened or endangered species and humans.
- Contractors will be prohibited, while working under contract, from carrying firearms into areas where roads are closed.
- All open roads and wetlands and connecting streams will have 75- to 100-foot hiding-cover buffers within the grizzly bear subunit.

BALD EAGLE

- In accordance with the Lower Stillwater Lake Bald Eagle Nest Plan, 200-foot buffers on perennial streams within the eagle-use area will be implemented during this sale.
- In Units 14 and 15, harvesting activities will not take place during the eagle nesting period, February 1 through July 31.

WOLVES

A contract provision will be included to protect any wolf den or rendezvous site within the gross sale area that may be discovered during implementation of this proposal.

BIG GAME

- Existing vegetation along open roads will be retained in harvest units to increase security by reducing road impacts to big game species.
- Summer thermal cover will be retained near riparian travel corridors.
- Existing road closures will be improved to ensure wildlife security.

WILDLIFE TREES AND SNAG RETENTION AND RECRUITMENT

- High-quality wildlife trees/snags, such as large, broken-topped western larch, will be designated for retention and given special consideration to prevent loss during yarding operations.
- Some large western larch (greater than 18″ dbh) with characteristics that indicate they could become high-value snags (stem rot or physical defects) will be retained.
- Some clumps will be retained to provide nesting habitat.

TOWNSEND'S BIG-EARED BAT

If any large aggregation of bats is discovered during the preparation or administration of this sale, the DNRC wildlife biologist will be informed immediately. Depending upon the nature of the report, the biologist will then coordinate efforts to determine the species. If Townsend's big-eared bats were determined to be present, further mitigative measures will be developed.

ROADS

- Information on road-construction activities and road use associated with road-construction activities will be relayed to the general public.
- BMPs will be incorporated in all planned road construction.
- Signs will be placed at some critical intersections.
- See the *EROSION* section.
- Under Action Alternative B, segments of some existing roads will be closed by sign or physically closed during harvesting activities for safety reasons.
- Road closures will be installed on specific roads to protect DNRC's investment and decrease road maintenance.

VISUALS

- Damaged residual vegetation will be slashed.
- The location, size, and number of landings will be limited.
- Disturbed sites along road right-of-ways will be grass seeded.
- Pockets or strips of the residual stands along topographic breaks and roadsides will be retained to limit views into harvest units.

ARCHAEOLOGY

- A review of the project area was conducted by a DNRC archaeologist.
- A contract clause provides for suspending operations if cultural resources are discovered; operations may only resume as directed by the Forest Officer.
- If cultural resources were discovered, the Confederated Salish-Kootenai Tribe has requested notification.

SOILS

COMPACTION

- Logging equipment will not operate

off forest roads unless soil moisture is less than 20%, frozen to a depth that will support machine operations, or snow covered to a depth that will prevent compaction, rutting, or displacement.

- Winter logging will be designated for individual units with sensitive soils.
- Existing skid trails and landings will be used where the design is consistent with prescribed treatments and meets current BMP guidelines.
- Skid-trail density in a harvest area will not exceed 15% of the total area.

SOIL DISPLACEMENT

- To prevent the displacement and erosion of topsoil, hard-tracked ground-based skidding equipment will not be operated on steep slopes (greater than 40% sustained over 300 feet.
- Brush piling with dozers requires use of an approved brush rake.
- Designated skid trails will be required in all areas where tractor yarding is proposed. Existing skid trails will be used when possible.
- Woody debris would be retained on site for nutrient cycling.

EROSION

- Ground-skidding machinery will be equipped with a winchline to limit the equipment-operation areas.
- Roads used by the purchaser will be reshaped and the ditches redefined following use to reduce surface erosion.
- Drain dips and gravel will be installed on roads, as needed, to improve road drainage and reduce maintenance needs and erosion.
- Some road sections will be repaired to reduce erosion potential and maintenance needs.
- Applications of certified weed-free grass seed and fertilizer will be applied in a timely manner to all reconstructed road surfaces and cut-and-fill slopes. Applications will also be applied to any existing disturbed cut-and-fill slopes and landings immediately adjacent to open roads. This will be done to stabilize soils and reduce or prevent noxious-weed establishment. This will include:
  - seeding all road cuts and fills concurrent with reconstruction;
  - applying "quick-cover" seed mix within 1 day of work completion at wet-culvert installation sites; and
  - seeding all road surfaces and reseeding culvert installation sites when the final blading is completed for each specified road segment.
- As directed by the Forest Officer, water bars, logging-slash barriers, and, in some cases, temporary culverts will be installed on skid trails where erosion is anticipated based on ground and weather conditions. These erosion-control features will be maintained and periodically inspected throughout the contract period or extensions thereof.

AIR QUALITY

The first item is designed to prevent individual or cumulative effects during burning operations. The next 2 items are designed to reduce effects from burning operations.

- Burning operation will be in compliance with the Montana Airshed Group reporting regulations and any burning restrictions imposed in Airshed 2. This will provide for burning during acceptable ventilation and dispersion conditions.

- Dozer, landing, and roadwork debris will be piled clean to allow ignition to occur during fall and spring when ventilation is good and surrounding fuels are wet. The Forest Officer may require that piles be covered. Covered piles are drier, ignite easier, burn hotter, and extinguish sooner due to higher relative humidity during spring. This would reduce dispersed (unentrained) smoke.
- In order to reduce smoke production, the number of burn piles would be minimized by leaving large woody debris on site.
- Dust abatement may be applied on some segments of the Martin Camp, Lupfer, and USFS 60E roads that are used during hauling, depending on the harvest season and level of public traffic.

FIRE HAZARD REDUCTION

- Smaller fuels should be piled to reduce fire hazards and would be burned within a 1-year period.
- Additional broadcast burning may be done to reduce fuels and improve natural regeneration potential in specific locations.
- Residual logging slash and tops would be lopped and scattered (usually to within 24" of soil surface to improve the rate of decomposition.

NOXIOUS WEED MANAGEMENT

- All tracked and wheeled equipment will be cleaned of noxious weeds prior to beginning project operations. The contract-administrating officer will inspect equipment periodically during project implementation.
- Prompt vegetation seeding (with a native grass seed mix) of disturbed roadside sites will be required. Roads used and closed as part of this proposal will be reshaped and seeded.

HERBICIDES

To further limit the possible spread of weeds, the following integrated weed-management mitigation measures of prevention and control will be implemented:

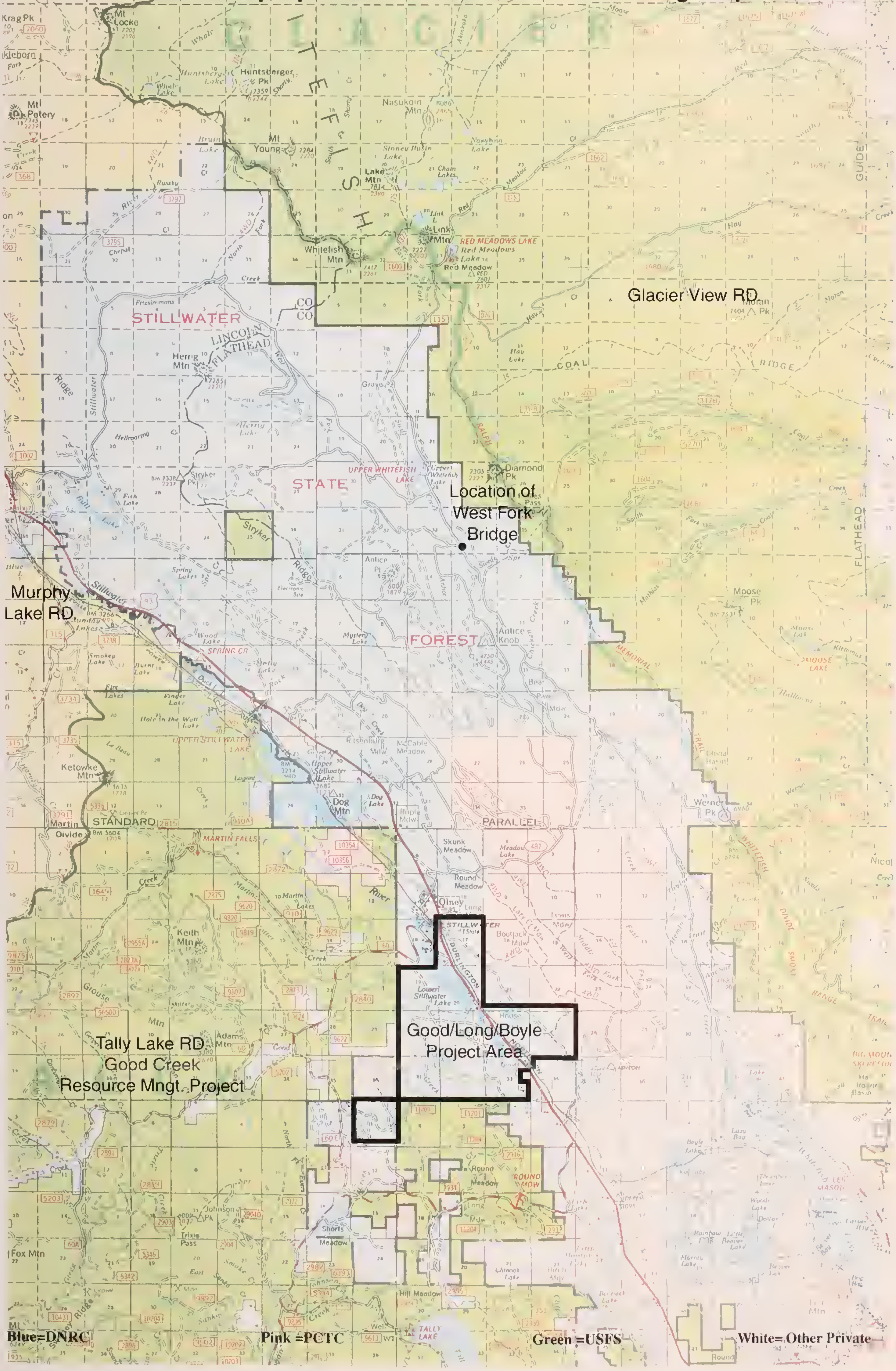
To reduce risk to aquatic and terrestrial resources, the following will be required:

- Compliance with laws, rules, and regulation of the State of Montana and Flathead County Weed District.
- All applications will adhere to Montana's BMPs and the herbicide's specific label guidelines.
- Herbicide application will not be general, but site specific, to areas along roads where noxious weeds are occurring. All no-spray areas will be designated on the ground before applications begin.
- Herbicides will not be applied to areas where ditch-relief culverts may contribute runoff directly into surface water.
- Application will be applied on calm, dry days to limit drift potential.

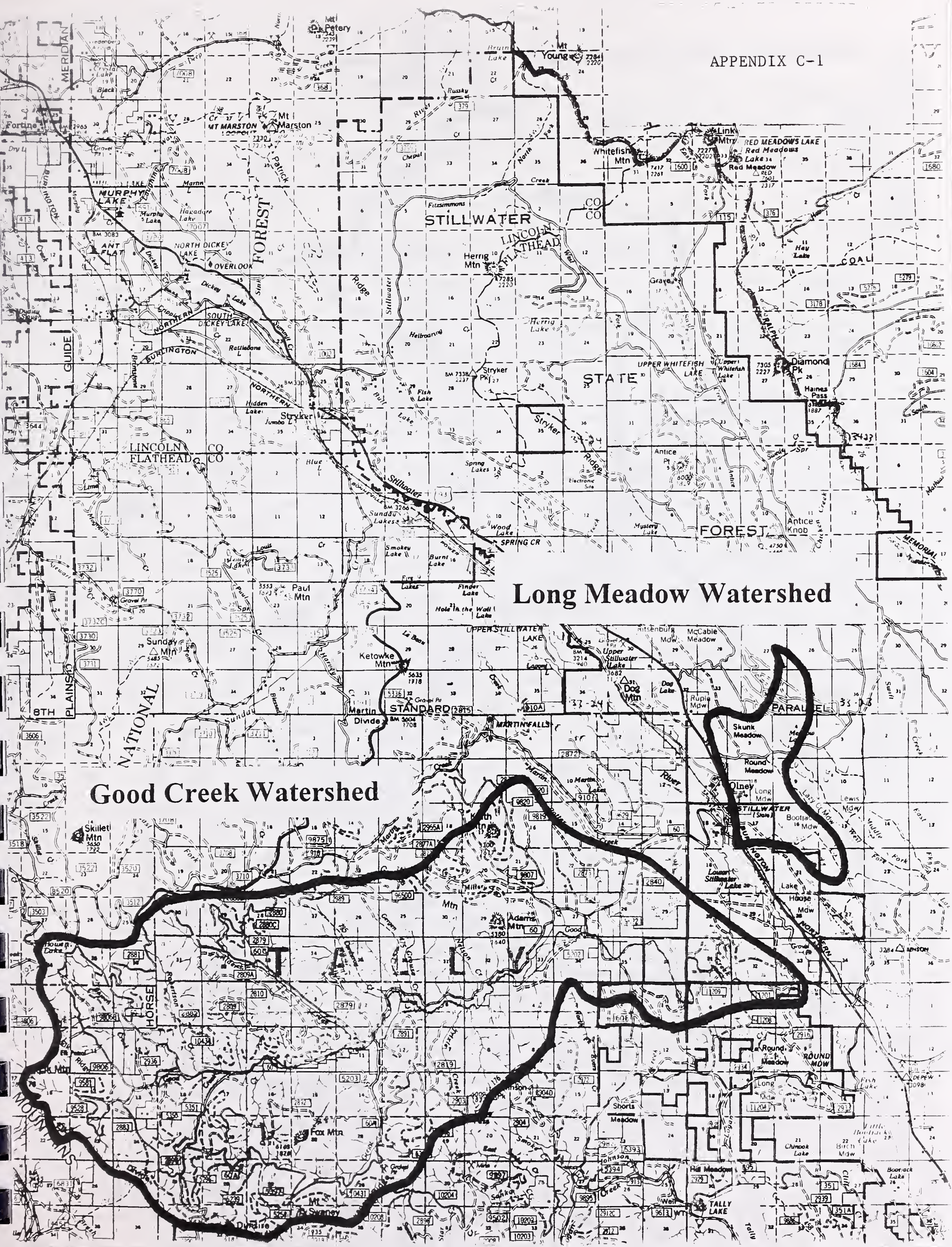
Appendix B

CONTIGUOUS STILLWATER STATE FOREST & ADJACENT FORESTLAND

Includes: Location of proposed action and West Fork Bridge replacement

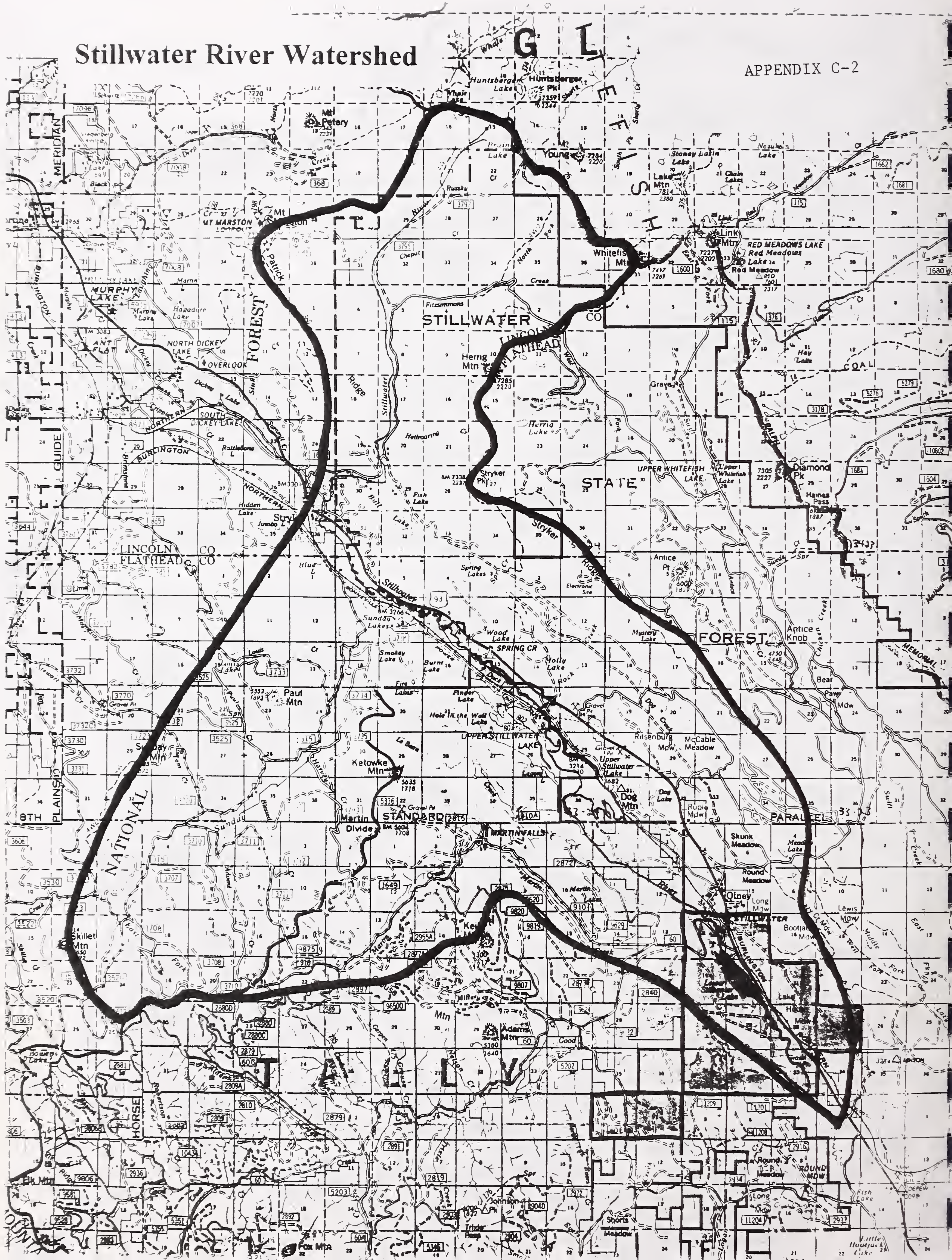


APPENDIX C-1


Long Meadow Watershed
Good Creek Watershed
STILLWATER
STATE
FOREST
NATIONAL
FOREST
LINCOLN FLATHEAD
Olney
STILLWATER (State)
Stryker
Fortine
Murphy Lake
Dickey Lake
Upper Stillwater Lake
Lower Stillwater Lake
Tally Lake
Red Meadows Lake
Mt Marston
Herrig Mtn
Stryker Pk
Diamond Pk
Antice Knob
Ketowke Mtn
Paul Mtn
Sunday Mtn
Skillet Mtn
Adams Mtn
Fox Mtn
Mt Swaney
Dog Mtn
Martin Falls
Skunk Meadow
Round Meadow
Long Mdw
Bootjack Mdw
Lake House Mdw
Round Meadow
Shorts Meadow
Hell Meadow
Ritsenburg Mdw
McCabie Meadow
Ruple Mdw
Lewis Mdw
Birch Mdw
Chinook Lake
Bootjack Lake
Fish Lake
Whitefish Mtn
Link Mtn
Mt Young
Mt Petery
8TH
GUIDE
MERIDIAN
PARALLEL
BURLINGTON NORTHERN
MOUNTAINS
HORSE

Stillwater River Watershed

APPENDIX C-2



APPENDIX D

LIST OF RELATED ENVIRONMENTAL REVIEWS

In order to address direct, indirect, and cumulative effects on a landscape level, the analysis must incorporate past, present, and future actions within the analysis area. The following activities are located within the Good/Long/Boyle environmental analysis area for vegetation on Stillwater State Forest and scattered sections to the north. The environmental analysis area for watershed, wildlife, soils, fisheries, and economics is somewhat smaller in size and encompasses an area specific to those disciplines.

State timber sales where the environmental analysis has been completed and sale activities have begun, but are not completed:

- Upper Stryker Ridge II Timber Sale (EIS completed in 1996)
- Stewart/Butcher Timber Sale (EA completed in 1998)
- Beaver Lake Project (Beaver 99 EIS completed in 1999)
- Cyclone/Coal Timber Harvest Project (Coal 99 EIS completed in 1998)
- Stillwater/Coal Salvage 2000

State Timber Sales where the environmental analysis has been completed, but sale activities have not yet begun:

- Beaver Lake Project (Beaver 2000 EIS completed in 1999
- Cyclone/Coal Timber Harvest Project (Coal 2000 EIS completed in 1998)
- Chicken/Werner Timber Sale Project (EIS completed in 1999)

State timber sale proposals where environmental reviews are in progress:

- Taylor South Timber Sale
- Young/Sophie Timber Sale

The West Fork and Dog/Meadow proposed timber sale projects have been identified on DNRC's 3-year timber sale list as the next potential projects for Stillwater Unit. Currently, there is no initial proposal/proposed action, and the potential projects have not been scoped; therefore, DNRC has not initiated a preimpact study on these proposals.

Activities other than timber harvesting that may affect resources within the Good/Long/Boyle Timber Sale Project area:

- Easement request through Section 33 of the project area to access private parcels along Stillwater River in Sections 28 and 29; analysis work has not yet been initiated.
- The American Timber Mill closure and the associated site rehabilitation work.

Other activities on adjacent ownership that may affect resources within the Good/Long/Boyle Timber Sale Project area:

- USFS Good Creek Resource Management project (EIS completed in 2000)
- Ongoing logging on Plum Creek Timber Company lands and other adjacent small private lands.

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